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THE FUTURE IN EDUCATION

PROBLEMS, POSSIBILITIES AND PROMISE

FRED D. KIERSTEAD
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EDITORS

SPECIAL TOPIC EDITION

OF THE

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IN
EDUCATION

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Preface

For more than fifteen years a field of study known as "futures research" has been making valuable contributions in planning, forecasting, and modeling alternative futures. But for many of those years there has also been misconception, misuse and even deliberate exploitation of the meaning of the term. Contrary to belief, futurists are not people who sell wheat or gold at the commodities exchange, those who have visions of impending events, or even those who read tarot cards and tea leaves. Because "the future" is elusive, unreliable, and relatively unpredictable, some have dismissed legitimate futures researchers along with the palm-readers as worthless abstractionists, charlatans, or naive romantics. Futurists would be the first to admit that there are quacks, trendy advocates, fair-weather friends and self-styled gurus who exploit the human need for certainty—predicting things people want to hear, or telling them what they don't want to hear in hope there will be continued need for their services. These people have often contributed to the social malaise experienced in recent years.

There is, however, a difference between predicting events (what card-readers do) and forecasting, doing trend analysis, using a cross-impact matrix, and developing time series analyses (some of the tools used by futurists). The difference is in the perspective of the future. When asked whether an event will occur or not, futurists would answer by saying "It depends" rather than yes or no. They see the future as a verb rather than a noun. Futurists are committed to a society that can be planned and directed. To them *the* future is not predetermined and can, in fact, be influenced by choice. There is no guarantee that the choices will produce the desired outcomes or even increase or decrease their likelihood. The importance is not, however, in the absolute accuracy of forecasts, but in the process itself. Most futurists are concerned with probables, possibles, *and* desirables, and therefore are not just predictors of coming events. Within their writings are value-driven conceptions of what ought to be, as well as what is and what could be.

An accurate description of the kinds of futurists is at best a difficult task. There are possibly as many kinds of futurists as there are people

in the field. It may be useful, however, to try to classify them into broader categories, although there is a real danger of oversimplification. It is even more of a danger to think that all futurists are the same. For the sake of clarity, each of these groups will be discussed in terms of premises rather than specific solutions.

The extrapolist futurists believe that the future will be a recognizable version of the past. The most important tool of research for these people is trend analysis. This school of futurists is the easiest to understand because it assumes consistency in trends. Positive extrapolists like Herman Kahn and Daniel Bell have faith that technology will solve most of our problems, and given freedom from restrictions, we as humans will be getting a bigger piece of an expanding pie of resources. The negative extrapolists such as Dennis Meadows and Robert Heilbroner believe that there are physical limits to growth. They contend that if we continue on the same path, collapse is inevitable. These "model of doom" futurists advocate control of growth, espousing the concepts of "enoughness," "appropriateness" and redistribution of resources. A great deal of the research and effort produced by both of these schools of thought is concentrated in studies of probability and possibility. In some cases, the positive extrapolists assume the continuation of the values and social structure. The negative extrapolists usually value system maintenance, at some cost to individual freedom.

Normative futurists, although they are also concerned with probables, spend a great deal of time on possibles and desirables. Within the normative group are the spiritual visionaries, the environmental visionaries and the societal visionaries. Spiritual visionaries like Willis Harman are image-driven and try to prescribe possible paths for intelligent choice. They work best in unstructured environments, using intuitive and personal processes to "image" alternatives. Their key to a positive future is to transform personal, individual values. The environmental visionaries believe that the key to a positive future is to provide new frontiers (such as space) for human exploration. Adrian Berry, for example, believes that within the next hundred years colonization and mining of resources in space will be a major factor in human survivability. Societal visionaries believe that we can create better futures by reconstructing the social institutions (including education) so that the society can be more synergetic and sapiential in its determination of desirable futures pathways. Many of the authors in this Special Topic Edition fall within this categorization.

All of the normative futurists are concerned with continued reevaluation of our goals and directions for possible redirection.

Policy analysts are the most systematic of the futurists and deal a majority of the time with finite cause-and-effect relationships. The purpose of futures research is viewed by them as providing options for decision-making independent of some larger context. Very often, the desirables (most often measured in terms of profit) are already known by this group—they are exploratory in that they test consequences of possible alternatives. Sometimes these futurists are called "think-tank" or "brain-trust" people because they usually work within structured organizations and corporations.

All of these futurist "schools of thought" provide valuable insight into the problems and possibilities to be faced. They are, however, very different in their analysis and criticism of present trends. Some of the general futurists mentioned have much to say about the role of education in the future, while others don't. Most futurists agree, however, that we are in a period of transformation. The need for environmental decision-making and alternative choices in education has never been stronger. Confusion and uncertainty are normal during periods of societal transition, but we as educators have the problems of overchoice. The alternatives suggested by these authors are presented as a way of coping with this problem.

The editors of this Special Topic Edition believe that education has reached a critical breaking-point. The ideas presented by the authors reflect this belief. The thoughts they are sharing took courage, because of the high probability of error and the elusivity of the "subject" being considered. Added to these liabilities is the wide range of alternatives being considered in education. There are always a large number of educational critics, but few who are willing to present alternatives.

We the editors hope that the volume presented provides alternative mind-sets to the industrial-era model used today to educate for "efficiency" and "productivity." Most of the authors are theoretical—a few are also concerned with methodologies. None suggest absolutes, but rather alternatives that warrant consideration. The presenters vary somewhat in their perspectives for the future—a necessary part of futures thinking. They also agree in some areas, adding credence to the premise that all is not right with the educational system as we know and espouse it. All of the authors understand that the future may

demand plurality and diversity in education in light of anticipated and unanticipated consequences of choices.

Houston, Texas
September, 1981

Fred D. Kierstead
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Editors

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The *Journal of Thought* is a quarterly publication devoted to encouraging scholars of diverse disciplines, nationalities, languages and cultures to examine the significant educational issues and problems from the perspective of their various disciplines. The Editors solicit material that treats the more comprehensive issues and problems confronting education throughout the world. Interdisciplinary dialogue among scholars is encouraged.

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THE JOURNAL OF THOUGHT WAS FOUNDED IN 1966 BY JAMES J. VAN PATTEN

Society and Foresight

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It has become reasonably evident over the last several decades that the continued stability and survival of our society increasingly depends upon long-range, anticipatory kinds of policy and decision-making. The world has become so complex and the costs of failure so high, that we can no longer afford a short-sighted or reactive approach to the problems.[1] The United States will of necessity have to play a leading role in dealing with the issues which threaten the survival of world civilization. And coping with these global issues will inevitably create internal problems in the U.S., which will also have to be managed.

In addition to the internal impact of these global issues, we face a growing list of domestic problems, some of which are unique to the U.S. and some of which we share with other industrialized nations. Indeed, our social agenda is over-crowded. Some of the older issues which are still with us and seem likely to persist are: racial inequalities, inadequate housing, a chaotic transportation system, the increasing unmanageability of our cities, persistent high levels of crime, poverty, unemployment, and inflation, a cumbersome and inequitable tax system, and an increasingly overburdened educational system. Science-related problems which will be of increasing importance include: shortages of energy and natural resources, increasing pressure on the natural environment, the need for social control of new technologies, the ethical issues posed by the "biological revolution" (psycho-active drugs, genetic engineering, test-tube babies, etc.), and the threat to privacy from electronic surveillance and computerization. In addition, we have some relatively new social issues which are complicating matters still further: growing dissatisfaction with older social goals and definitions of the quality of life, a proliferation of changing lifestyles, increased political polarization, and high levels of alienation among the young.

Though certainly not complete, this is still a pretty awesome list. Nevertheless, these are all issues that can be dealt with *if* we can

generate the political will to establish the necessary long-range programs. There will be no quick or easy answers because these issues are all interrelated; the immediate causes of each are largely to be found among the consequences of the others.[2] Foresight, patience, and a shared sense of purpose will be the keys to managing successfully.

But *will* we manage successfully? It is by no means certain that we will, since it is precisely our lack of these key attributes in the past which has created this swollen social agenda. Lack of foresight, particularly, is the problem which underlies all the rest, and our ability to cope with the future will depend in large part on what we do to create a more forethoughtful citizenry.

We *are* an improvident nation—not always, nor in every area, but often enough to make it a conspicuous national habit. The American voter is a notoriously present-oriented individual; there is still ample wry truth in two of the oldest gag lines in politics: "Yes, but what have you done for me lately?" and "What has posterity ever done for me?" Businessmen are not much better—anything beyond 12 months is defined as "long-term"; and *very* long-range forecasting, i.e. five to ten years, is considered to be "blue-skying," and not completely respectable. And (except for enrollment forecasts) education pays virtually no attention to the future at all—long-term or short-term.

In some cases, we have even grown so used to such behavior that it seems natural and proper. An example is our health care system, devoted almost exclusively to treatment of disease, even though preventive medicine is known to cost less in dollars and human suffering. When we get sick, we want the doctors to make us well, but it rarely occurs to us to blame them (or ourselves) for the onset of the disease. The normal case is for us to simply ignore a problem until it turns into crisis, and then to wish that we had taken preventive action earlier.

Perhaps it is misleading to say that we lack foresight. In many instances such as our recent energy difficulties, we have had ample evidence about the nature of the problem and the need for preventive measures for a surprisingly long time before the crisis was reached.[3] The *crisis* comes because we refuse to believe or act on such advance information.

Why do we so often fail to look ahead? Why, even when we do look ahead, do we so often continue to act in a short-sighted manner?

These questions are real, not just rhetorical. We act the way we do, not out of stupidity or moral defect, but because our traditions and our institutions encourage and support a more short-term, reactive approach. Nor is this completely without reason or merit. In many areas of our economic, social, and political life, we are a highly flexible and fast-reacting people. Historically, we have been able (with some important exceptions, like the 1930's Depression) to use our reactive ability as a substitute for foresight and anticipation. Costly though it was, we could afford to wait for a Pearl Harbor before mobilizing because our capacity to *react* was so large.

Unfortunately, we are facing a growing number of problems as the rate of change increases; and as we build our technological castles higher and more intricately, we are increasingly unable and unwilling to endure the crisis culmination of each problem. We are also less able to command instant solutions even when we mobilize our very considerable resources. It is one thing to throw dollars into a disaster-stricken town and expect it to be on its feet again in a year; it is quite another to throw dollars into fusion research and expect to have fusion reactors going in a year or even in a decade; we simply cannot count on getting magical results.

If we are going to generate the kinds of foresightful policies that will anticipate and avoid (or at least minimize) potential crises, we need to understand the social and traditional forces that work *against* foresight and anticipation.

What follows is a necessarily superficial but perhaps revealing look at six main areas of society and the roles they play in institutionalizing a reactive and past-oriented approach. The six areas are:

- Politics
- Economics
- Forecasting ability
- History / ideology
- Media
- Education

Several contributing factors are examined in each area.

Table 1

24 REASONS WHY WE LACK FORESIGHT

POLITICS:
- Two- to six-year terms of office.
- Lack of public demand (or even tolerance) for anticipatory action.
- Tendency to praise or blame incumbent for situations his predecessor created.
- Vicious circle from lack of foresight—"the perpetual double bind."

ECONOMICS:
- Political hostility toward speculation, innovation, and uncertainty.
- "Discounted future values"—interest rates dominate social foresight.
- Paper economics applied to perishable real resources.
- "External" costs minimize true long-term costs.

FORECASTING ABILITY:
- Increasingly rapid change, thus increased difficulty (and necessity) of forecasting.
- Primitive methods.
- Scarcity of funding and of trained forecasters.

HISTORY/IDEOLOGY:
- Long period with the wealth and physical space to absorb mistakes.
- Faith in the inevitability of "progress."
- Patriotic belief that "the American system" is so good that it is self-guiding (or divinely guided).
- Fatalism (from religion, apathy, or felt impotence) and "presentism"—live each day one day at a time.
- Withdrawal from future shock.
- Collapse of a shared sense of national purpose.

THE MEDIA:
- Lack of conceptual sophistication about the future.
- Lack of means for (and interest in) judging scientific competence.
- "Orthodoxy of optimism," derisive attitude toward those who warn of problems.

EDUCATION:
- Historical orientation toward the past.
- Traditional and glacially unresponsive bureaucracy.
- Built-in 10- to 50-year lag-time.
- Lack of recognition by parents and educators of the need for anticipation in a rapidly changing society.

Politics

The American political system has shortsightedness built right into its bones. We want our politicians to be accountable to the public, and we try to achieve this by having them stand for re-election every two, four, or six years. The price we pay is that the *average* amount of foresight we can expect from them is one, two, or three years, because a politician can seldom afford to look beyond the next election. This is made even worse if the voters are very short-sighted (and have even shorter memories).

Take the case of the 1972 presidential election. The preceding four years were characterized by generally high rates of inflation and a recession. Highly inflationary policies were introduced in 1971 and 1972 to stimulate an economic recovery and boom during the summer and fall of 1972. To counterbalance the excess inflationary pressures, the government instituted wage and price controls in the summer of 1971, despite the evidence that such controls tend only to postpone the inflation, distorting the economy and producing a much higher rate of inflation when they are lifted.

Inflation was running at a "politically unacceptable" rate of 4½% when controls were instituted; when they were lifted, six months *after* the election, inflation promptly soared to more than 10%, accompanied by persistent economic stagnation. In spite of all this, the public in 1972 rated Richard Nixon's handling of the economy very favorably, and this is believed to have contributed significantly to his landslide re-election. A small bubble of economic euphoria, timed exactly right for the campaign months, counted for far more than all of the preceding and following years of economic distress.[4]

Another implication of this narrow time perspective of voters is that politicians are often unfairly blamed or credited for the results of their predecessors' actions (e.g., it might be unfair to blame Richard

Nixon for the first recession in 1970; it is certainly unfair to give him credit for the Apollo moon landings, although he got considerable political mileage out of them). The result is that a political leader in office has a strong incentive to take credit for whatever long-term programs were financed and set into motion five, ten, or twenty years ago by his predecessors; at the same time, he has an incentive to keep taxes down and to spend money where there will be short-term benefits, rather than instituting and funding the long-term programs which we will need later. *He* will not pay the price, of course; his successor will.

This kind of approach can rapidly initiate a downward spiral, a "perpetual double-bind." An ounce of prevention really is worth a pound of cure. If a politician finds that all of his political and economic resources are exhausted in patching up the crises which his predecessor failed to prevent, he will have none left over to prevent current problems from becoming crises for his successor. His successor will then have to spend resources "by the pound" for cure, with no "ounces" left over for prevention, thus perpetuating the cycle.

When immediate wants are pursued to the exclusion of long-term necessities, the efficiency of the whole system declines until eventually even the immediate wants cannot be met. Yet, with politicians forced to scramble to please a short-sighted populace, it often seems that the political system itself makes this trap almost impossible to avoid.

Economics

This potential for a short-sighted bias in government is amplified when the government's actions impinge on the economy, because the economic system's foresight mechanisms are extremely vulnerable to political interference. In its most oversimplified form, a market economy can be visualized as a purely reactive system in which continuous price fluctuations are used to allocate goods and services among different users and to channel the economy's productive capacities toward their most efficient uses.

The basic assumption is that the market responds quickly to disparities between supply and demand. If demand exceeds supply, the prices go up, reducing the demand and increasing profits. This draws new producers and new resources back into the market, which increases the supply and drives the prices back down again. If the supply increases too far and exceeds the demand, this drives the

prices down further, which drives some capital and resources out of the market, which reduces the supply, which drives the prices back up again. If the product is a necessity, a small shortage may produce a big increase in prices and, therefore, "windfall profits," but these high prices are also a big incentive to increase production rapidly, which is to society's benefit if the product is truly a necessity.

In practice, of course, markets never behave in this purely reactive way. If a buyer anticipates a future shortage, he would be wise to buy in advance, even if he has to pay a little more. Likewise, the seller who anticipates a glut can cut his prices in anticipation of the glut, in the hopes of getting rid of his soon-to-be-excess supplies. Even people with no direct use for a product may get involved in buying and selling it, speculating on future price changes.

As a result, every price decision in the market place is permeated not just by the *current* balance of supply and demand, but the collective opinion of everybody involved as to the *future* balance of supply and demand. This is even more the case with decisions to increase or decrease production, and still more true of decisions to make (or not make) large capital investments. Whether you are considering building a power plant or going to law school, it is not the *current* demand for energy or lawyers which counts, but the *expected* demand after the plant is finished or the degree is earned.

A market economy thus has at least a certain amount of foresight built into it. But a number of factors influence how far ahead the market looks and how well its decisions correspond to the long-term social good. Foremost among these influences are the prevailing degree of risk, the likelihood of commensurate reward, the accuracy with which the economic costs of a project reflect its actual social costs, and the prevailing economic discount rate.

Risk and reward, of course, are what capitalism is supposed to be all about. Entrepreneurs are encouraged to risk their own capital to produce goods and services, a risk which they *hope* the market will reward. If you turn $200 worth of materials, labor, rent, and taxes into a widget which people will willingly pay $300 for, then you have invested your capital productively and have increased the total real wealth of the society by $100. To encourage you to do so, you get to keep the $100 (or, more accurately, to split it with the IRS). On the other hand, if you turn $300 worth of capital into something which the market values at only $200, then that's your tough luck: the lost

$100 is your penalty for investing capital unproductively and reducing society's real wealth.

In addition to its carrot-and-stick function, profits control the flow of capital. Good decision-makers get more and more resources to manage, and bad ones get fewer and fewer. Productive firms grow and unproductive ones die. And this constant flux ensures that resources are, on the average, managed as well as possible and that the economy as a whole remains productive.

Unfortunately, the process is always imperfect, and often painful, and it is sometimes necessary, and even more often tempting, to interfere with it. The problem is that most such tampering has the side effect of reducing what foresight the system does have. Consider, for example, the negative connotations of the terms "speculator" and "windfall profits." Each conjures up the vision of people making a great deal of money *undeservedly*—by luck or by taking advantage of others' misfortunes—and so there is always a temptation to confiscate the profits, either directly or through punitive taxes.

But the possibility of getting rich by pure dumb luck is absolutely essential to balance out the very real possibility of losing everything because of some unfortunate chance event. Few people will take risks with their money if the *best* that they can expect is a "reasonable profit" and the worst is a total loss. Indeed, it can be argued convincingly that the possibility of a really large jackpot is a far more effective incentive for entrepreneurs and investors than the same *average* return on investment would be if it were spread out more evenly.

Even if there were no need for a "balance of luck," unusually high prices and profits serve a useful function in alleviating a shortage. As prices rise, steps are taken to reduce waste, those who can do without stop buying, and others find that they can do with less; witness the drop in U.S. gas consumption in the late 70's after decades of steady increase. Indeed, if prices rise high enough, they may succeed in tapping unsuspected reserves, either previously hoarded or simply dispersed and ignored.

But what of the pure speculators, the individuals who try to make a fast buck by buying low and (they hope) selling high? Surely they contribute nothing? Indeed, "parasite" is one of the milder epithets commonly thrown at them. Yet the speculators provide a large part of what foresight the market possesses. By buying when prices are low, speculators help soak up excess supplies and keep production from

dropping further, thus reducing the chance (or severity) of a subsequent shortage. By storing commodities in the hopes of a price rise, speculators provide an essential reserve for society, at no cost. And by selling when prices are high, speculators increase the available supplies, help alleviate the shortage, and thus actually help hold peak prices down.

The arguments against speculation are usually based on a vague moral objection to gambling or to driving a sharp bargain, in spite of the fact that one of the few direct biblical references to the social importance of foresight is an unmistakably favorable description of grain speculation. If it was meritorious for the Pharaoh to store up grain during the seven fat years to provide for the seven lean ones, why should it not be for the speculator who does the same? Indeed, one of the ironies of economic life is that societies which make a habit of passing "windfall profits" taxes and laws against hoarding and "profiteering" generally end up suffering from greater price instability and worse gluts and shortages.

Even in the absence of such self-destructive interventions, the market may not be able to exercise sufficient foresight. For example, faced with a distant but foreseeable shortage of something important, the market may still fail to make the investments necessary to increase production. In the first place, the longer the delay, the greater the chance that something will go wrong and thus the greater the risk of the investment. In the second place, the value of an investment depends not just on the expected profits, but on the amount of time that you must wait for those profits and on the interest rates during the intervening period.

Suppose I offer you a piece of paper promising to pay you $1,000 ten years from now. How much would you be willing to pay me for that paper today? At the moment, you can get a safe 14% return on your money in a long-term investment, and it happens that $250 invested at 14% will be worth about $1,000 in ten years at compound interest. So, provided you don't think there is any risk in accepting it, my promise to pay you $1,000 ten years from now would be worth only $250 to you right now. The market goes through a process like this to determine the *present*—or discounted—value of any *future* benefit. As a result, other things being equal, people have a strong incentive to invest in short-term projects instead of long-term projects.

Furthermore, what happens when we apply this kind of thinking to

perishable resources like land, instead of replaceable items like factories? Take timber as an example. It takes about 30 or 40 years to replace a mature tree. That means that you can harvest only about 2.5 to 3% of the trees each year, year after year, if you want to maintain a stand of timber as a renewable resource. This corresponds to a "real" rate of return of about 2.5% on your capital. On the other hand, you can clear-cut the whole stand and sell the timber and you can currently get almost twice that rate of return, *after* adjusting for inflation, by investing the proceeds in high-grade long-term bonds.

"Obviously," the only sane thing for you to do is to clear-cut the land. Just as obviously, this kind of economics produces a nation without forests. The same dilemma faces the rancher trying to decide whether to overgraze his land or not, and the farmer trying to decide whether to practice expensive soil-conservation methods (or, for that matter, whether to give up and turn the farm into a subdivision).[5]

There is an important and ironic corollary to this, which is that the more prosperous a society becomes (i.e., the higher the rate of real economic growth), the more short-sighted it becomes. Of course, the more shortsighted it is, the more it tends to destroy irreplaceable resources like land. The more basic resources it destroys, the more difficult it becomes to maintain the high growth rate, and eventually the economy shifts from rich-and-foolish back to poor-and-wise, with a high value on perishable resources.

Shortsightedness in our economic system is further aggravated by what are known as "external costs." This is a polite euphemism that economists use when the public is forced to pay part of the cost of producing something while an individual or company retains all of the profits. For example, the pollution spewing out of a steel mill may triple the costs for clothing and laundry in the sourrounding town. The pollution will also have an effect on the health of the townspeople and increase the bills for medical care—not just in the present, but sometimes for many decades into the future. These costs of making steel are, of course, paid by the townspeople, not by the steel company. The same is true whenever the public pays for what, by rights, only the company and its customers should pay.

Since most of the costs which companies are successful in pushing off onto the public—especially the damage to health and to the environment—are long-term costs, this tends to further unbalance the relationship between short-term profit and long-term cost, making us even more shortsighted. In the previous discussion of timber land, for

instance, the immediate profits of clear-cutting are compared with the long-term costs *to the owner* or foregoing future value from that forest. The comparison might be a little closer if the owner had to consider not only the value of the trees that will not be grown on it, but the value *to the public* of the streams that are polluted, the beauty that is destroyed, the species that are wiped out, and the supply of resources which are destroyed and denied to future generations. It may be hard to state the values of these things in dollars, and it may be even harder to discount these values to find out what they are worth to us now, but without some way to internalize these costs, our economic system will continue to be automatically shortsighted.

Forecasting Ability

Another important reason why we lack foresight as a society is that foresight is becoming harder and harder to achieve. The higher the rate of change, the more new problems we have to cope with and the more we need to try to anticipate the future; at the same time, the higher the rate of change, the more inundated we are by unanticipated events and consequences, and the more difficult it becomes to anticipate anything (except the continued dislocations of change). The new discipline of "futuristics" has developed a number of new techniques for long-range social and technological forecasting, but these new methods have only barely offset the increasing volatility and "crisis-density" of our society. Like Alice and the Red Queen, we have to run harder and harder just to keep from falling behind. But for the layman—which includes the man in the street and most politicians, administrators, and businessmen—things have not stayed even, they have become continually less predictable; the result is an accelerating case of future shock.

Even the professional futurists have no claim to a crystal ball. The field is very new, the methods are still somewhat primitive and only partially validated, and a tremendous amount of work needs to be done, both to develop the methods and to apply them to the whole breadth of social issues. Unfortunately, for the reasons discussed above under "Politics" and "Economics," both government and business in the United States are relatively uninterested in the long-term future and, therefore, invest only a trickle of funding in the development of forecasting abilities. This shortage of funding for basic research in forecasting, coupled with the newness of the field, means that there is also a severe shortage of people trained in fore-

casting. Most futurists are trained in some specialty and then branch out into applied forecasting, often on a part-time basis. As a result, the field as a whole loses both the research they would have done as students if they had trained in forecasting originally, and the basic research they would do if futuristics were their primary professional allegiance.

History / Ideology

Even where we have the ability to understand the future and anticipate future problems successfully, we tend as a nation not to be interested in making the effort to do so. The origins of this attitude are tangled up in our national history. For a long, long time we had sufficient surpluses to make up for misuse and the absence of planning. The total lack of land-use policy, for instance, doesn't matter very much when there are billions of acres of unclaimed and unsettled land.

This long history of wealth and growth has greatly enhanced an ideological commitment to shortsightedness that is partly a fervent belief in the inevitability of "progress," especially scientific and technological progress, and partly an equally fervent faith in the unguided wisdom of the "American system." The former—the notion that more technology means a better life—is finally being called into question. The latter is a sort of societal version of Adam Smith's "invisible hand," a belief that thousands upon thousands of short-term decisions made from personal self-interest will automatically add up the best long-range policy for the group. As we saw in the discussion of "Politics" and "Economics" above, there are excellent reasons for thinking that exactly the opposite is true.

We have also inherited a strong strain of philosophical and religious fatalism and "presentism." Christianity has always had a basic, though sometimes played down, belief that the mortal world is unimportant except as preparation for the afterlife; the implication is that the only future that has any bearing on present actions is a future that lies after death, not the more immediate future here on earth.

Nor is this kind of passivity confined to Christianity. The poor and the powerless everywhere have tended to console themselves with a belief in a predetermined and unknowable, and therefore irrelevant, future: "Que sera, sera"; "Why should I worry about what I can't change? I just take it as it comes." "You just take care of today, and let tomorrow take care of itself." "Imsh'allah." "I trust in the Lord,

and accept whatever the new day brings." Such beliefs are an important psychological defense against powerlessness—worrying about what can't be helped creates unnecessary anxiety, frustration, and rage—and the resurgence in cults and "born again" fundamentalisms is one of the most visible symptoms of future shock. But when fatalism becomes an article of faith, preached to all as moral and "true," it can reduce people's ability to change what *can* be changed.

Although we may have inherited a belief that if we take care of today, tomorrow will take care of itself, we have two additional reasons for lack of interest in the future which are quite modern. The first is that many people faced with overwhelming future shock cope with it by apathy and withdrawal. The second and more important is the pervasive feeling that we have lost any collective sense of national goals or national purpose. It is quite true that if you don't know where you are going, any road will take you there. Without a positive sense of our objectives, we are forced to fall back on the purely negative strategy of trying to avoid crises and disasters. The lack of coordination of the resulting decisions is wasteful and literally pointless. It was primarily dissatisfaction with this aimlessness which elected the Reagan administration, and it will be interesting to see if a conservative leader is capable of generating a coherent vision of national goals which the public will adopt.

Media / Press

The fourth major source of our lack of foresight as a society is the peculiar attitude towards the future, and the general incompetence in dealing with it, that have been displayed by the information media. Among other things, some parts of the media, particularly television, are not very good at coping with complex issues, and consideration of the future is seldom simple.

This is exacerbated by the fact that most newsmen have not grasped the fundamental distinction between a forecast and a prediction. Many scientists and academics have had the unhappy experience of seeing cautious and highly conditional forecasts turned into flat predictions in newspaper headlines. The practice is unfortunately almost universal. One well-known book (*The Limits to Growth*, by Donella Meadows, *et al.*) has been the victim of thousands of cases of this kind of distortion over the past decade. In the book the authors carefully and systematically lay out a number of alternative forecasts,

some of which are based on policies which lead to disaster, and some of which are based on policies which lead to a relatively happy "equilibrium" world. The book was widely discussed in the press, and, in spite of the authors' repeated and emphatic statements to the contrary, nearly every columnist and TV commentator described the book as predicting inevitable disaster.

To complicate matters still further, most reporters, like most Americans, have no basis for judging *competence* in the worlds of science and academia, so that when, for example, the National Academy of Sciences says that we are running out of affordable oil, and the head geologist of Texaco says that there is plenty of oil, the newsman tends to report, "Scientists disagree about how much oil is available." The fact that the two forecasts come from sources of differing reliability, are probably based on entirely different economic assumptions, and might not even have been in conflict with each other, is considered too complex for the audience to understand. In any case, newsworthiness is always treated as more important than competence, with sometimes bizarre distortions of the quality of information reaching the public.

Another related way in which the media contribute to the problem is the orthodoxy of optimism, which leads them to deride all who warn of potential difficulties as "doomsayers" or, even more idiotically, "doommongers." It would hardly be original to point out that attacking those who warn of danger does not prevent disasters instead, it prevents one from hearing about potential disasters in time to avoid them or prepare to cope with them. The point seems, however, to have escaped the notice of many Americans and nearly all reporters.

Education

The sixth, and in some ways the most important, source of our national myopia is our educational system. Historically, the schools have been assigned a highly conservative role in society. Education is the guardian of continuity. Traditionally, its job has been to insure that the new generation resembles the old sufficiently so that the existing institutions, social arrangements, and methods for handling people will continue to work.

Not surprisingly, the administration and management of education attracted people in psychological sympathy with the fundamentally conservative role of education. The result, over several centuries, has

been a traditional and glacially unresponsive bureaucracy.[6] But in times of rapid change, "continuity" requires a fundamentally different approach. It can only be achieved by schools that not only keep up with change, but manage to anticipate it by at least some part of the lifetime of their students.

The depth of this bias toward the past is demonstrated very nicely in an otherwise admirable article in *Educational Leadership* entitled, "What is Relevant for Today's Students?" The author, Galen Saylor, is a professor of education at the University of Nebraska and a widely respected expert on curriculum development. In the article, he argues cogently for changes in the content of the curriculum and in the manner of teaching it, reforms which he believes will make education more relevant to "today." Outside of the classroom, however, he is opposed to any significant change in the *structure* of education:

> One final point about what is relevant in today's schools. The school as an institution has three primary functions: (a) to contribute in significant ways to the transmission of the culture of our society; (b) to serve as a major agency in the socialization of the young; and (c) to contribute fully to the maximum development of each student. Most of us feel that our schools have not adequately fulfilled these essential functions in the past. But such inadequacies do not call for or justify demands that the school as an institution be radically uprooted, become merely one of many voluntary agencies for the schooling of the young, or serve simply as a vehicle for the radical reform of society.[7]

Ignoring the exaggerated language in the last sentence, this is essentially a statement of conventional, past-oriented objectives, a concession that schools have failed to achieve them, and a denial that this failure warrants any "radical" change in education as an institution. One is forced to wonder why. Are the failures of education entirely the fault of teachers and not at all due to the structure of the institution? It seems like an unlikely notion. Even if it were true, and a single set of reforms could correct the situation now, new situations would soon require new reforms. At some point it becomes more efficient to reform ("radically uproot"?) the institution itself to make it better able to anticipate and cope with change.

Saylor's strawmen illustrate, however, an important dilemma facing any would-be educational reformer. If a school attempts to prepare students to cope with change, it is seen as *advocating* change

and can expect to be roundly denounced for its "radicalism." Even the educational reformer tends to aim at bringing the schools "up-to-date," making them relevant to the present, without realizing that the structure of education makes this inadequate.[8] We educate a child and expect him to use that education during the adult life which follows. This means an *average* delay of 30 years, from the middle of the education period to the middle of the adult life span. This time lag makes a mockery of our "current events" courses and other attempts to be very modern in our curriculum: whether we teach about the past or the present, it will all be history to the student when he must make use of it as an adult.

If schools today are educating tomorrow's adults, it really seems self-evident that they should concern themselves seriously with tomorrow's world. Yet, until very recently, such consideration of the future was almost forbidden among professional educators. It is still looked on as somewhat radical and faintly improper. Saylor, for example, manages to get through an entire article on "what is relevant for today's students" without making more than a single, oblique reference to the future. Ironically, that same issue of *Educational Leadership* started off with an editorial by Vernon Smith on educational taboos, which concluded as follows:

> The future is both the most critical educational taboo and the ultimate social reality. In earlier societies the future was the realm of religion. The task of the schools was the transmission of the past to the children of the present. But in one generation the future moved from the metaphysical to the physical. Man found the power to determine his future absolutely—he can destroy himself and life on the earth as we know it. And he has a growing number of alternative ways to do so, thanks to science, industry and technology.
>
> A society with alternative modes of self-destruction cannot leave its future to change. A democratic society cannot put its future in the hands of the elected or the powerful, for the future is the responsibility of every man. The future of mankind must become the central concern of the curriculum. Education must help children to learn to control their futures: to plan, design, and select from among various alternative futures. (p. 9).

This is, indeed, what education must do. But it will not be able to do it until educators and the public become more willing to tolerate educational change, and until the institutional structure of education is overhauled to make educational change more possible.

The Other Side of the Coin

We have had a quick glance at some of the ways that shortsightedness is built into the American system. It would be wrong to overstate the case, however. There are also, thankfully, some pressures in the opposite direction. If we have inherited strong strains of fatalism, apathy, and blind optimism, we have also been influenced by a tradition of longsighted Yankee shrewdness. "Que sera, sera," is counterbalanced by "a stitch in time saves nine"—not to mention the Boy Scout motto. In the past few years, moreover, we have lost quite a bit of our belief in the inevitability of progress and in the inevitable unguided wisdom of the system.

In politics, in particular, we have occasionally been blessed with men and women who care deeply about the future of the country and are able and willing to look beyond the next election. If fact, some cities and even whole states in the U.S. are remarkable for their "governability" and their long histories of good government. The two are reciprocal, of course; good government anticipates and prevents the kinds of crises, frustrations, and inequalities that breed hostility and destroy the basic sense of legitimacy and social cohesion that makes good government possible. As long as each successive mayor or governor makes most of the needed "stitches" in time, it is possible for such a tradition to endure for a considerable period. It is not always the politicians who break faith, either. In some cases the public goes on a spree of irresponsibility, living off the efforts of the past and refusing to finance the necessities of the future.

In education, the saving grace is that people learn and remember best what seems most important to them. Thus, if only one-twentieth of schooling seems relevant to a student, he will probably remember that small part better than all the rest put together. Furthermore, the troubled state of both education and society has led a growing number of teachers and administrators to the conviction that education must abandon its preoccupation with the past and begin preparing students for the future. Their efforts, supported by intense student interest, are beginning to affect the educational structure and will begin to affect the general public as their students grow older.

And learning, of course, doesn't end with school. Education of the public can seem terribly slow and difficult for those attempting to bring it about, but it is heartening to consider the large number of adult Americans who have educated themselves about the environment just in the last decade.

Furthermore, there are signs that the public is becoming fed up with a reactive style of management and the continuing string of crises that it entails. The energy crisis, continued galloping inflation, the steady decay of our big cities, the sometimes disastrous effects of unchecked technology, and a growing awareness of the threats to our survival—all of these have contributed to a greater willingness on the part of the public to consider some basic long-range changes. If this is so, and some group or political leader can offer the public a convincing and forethoughtful vision of what ought to be done, then it seems possible that we may yet regain a sense of perspective and national purpose.

It is a goal worth achieving. As C. P. Snow has put it,

> The world's greatest need is an appetite for the future. . . . All healthy societies are ready to sacrifice the existential moment for thier children's future and for children after these. A sense of the future is behind all good policy. Unless we have it, we can give nothing either wise or decent to the world.[9]

Notes

[1] In an interview conducted by G. R. Urban, Eric Jantsch had these comments on survival and the need for anticipation:

> The uniqueness of our situation is quite easy to explain: the time-scale on which we work has undergone a sea-change. In earlier times we had time to react to slow changes in our environment. It took thousands of years for man the hunter to become an agricultural worker and for the latter to become an engineer in electronics. Today we have such a dangerously short time-factor at play that we have to act in anticipation. To spread the word around about this is going to make some of us highly unpopular. I have already said that the full satisfaction of short-range demands will almost automatically involve us in long-range disaster. So, to protect ourselves against long-range trouble, we ought to take restrictive steps right away, which people will not like. They will appeal to their protective shield ("hope" if you like) and shove the really important problems under the carpet. Alas, these problems will not go away. (Toffler, *The Futurists*, p. 226)

[2] Franklin Tugwell's comment on the origins of our current difficulties is pertinent:

> (This is) a time when we recognize that many of our most pressing problems are the long-term results of short-sighted policies or at least policies in which assumptions about the future went unexamined. (*The Search for Alternatives*, p. ix.)

[3] For comments on advance forecasts about the energy crisis, see Lester Brown, *The Twenty-Ninth Day*. (New York, Norton and Company, 1978, pp. 97–127).

[4] For a further discussion of the pattern of inflation before, during, and after the wage/price controls of 1971–1973, see Milton Friedman, "Perspective on Inflation," *Newsweek*, June 24, 1974; page 73.

[5] In "The Carrying Capacity of the Globe," Jorgen Randers and Donella Meadows gave this summary of the problem of economic shortsightedness:

> This acceptance of "the invisible hand" has, however, introduced a strong emphasis on short term benefits. When an action will bring both benefits and costs over time,

individuals use the concept of net present value and discount the future implications so that they can determine whether or not an action is profitable—and hence should be taken. The result of this procedure is esentially that a value of zero is assigned to anything happening over 20 years in the future. In other words, actions are taken even though their cost to society 20 years hence will be enormous—simply because the benefits are larger than the costs in the short run. (*Sloan Management Review*, Winter 1972, p. 21.)

[6] Several comments on educational change, and resistance thereto, may be relevant at this point:

> Our educational enterprise is not only extensive, but it is also rich in tradition and even myth. The rich tradition has accumulated inertia making education cumbersome and slow to respond to a changing environment. Many educators and political leaders say that our educational system must be radically altered to meet the challenge of a rapidly changing world. Some believe that the present system can be modified to meet this need, and others think nothing less than a complete overhaul will suffice. (Hirsch, *Inventive Education for the Future*, p. 3.)
>
> Educational systems everywhere are under great stress, in part because of the sheer lack of resources and in part because of the lack of relevance, a failure to change and adapt. (Brown, *World Without Borders*, pp. 115–116.)
>
> Supposedly, the decade of the sixties was one of school reform: in the curriculum, in the organization of the school classroom, and in instruction. But recent studies reveal that the appearance of change far outruns the actuality of it. . . .
>
> Despite emphasis on the need for identifying goals, few schools have a clear sense of direction. Despite the obvious futility of "teaching" the world's knowledge, schools still emphasize the learning of facts rather than how to learn. (John Goodlad, *et al.*, in Hostrop, *Foundations of Futurology in Education*, pp. 221–222.)

See also "Resistance to Innovation in American Education," by David Nasatir (Chapter 16 of *Inventing Education for the Future*, edited by Werner Z. Hirsch).

[7] The Saylor quotation is from page 44 of the October 1973 issue of *Educational Leadership*.

[8] The "present: orientation of many curriculum experts (which is really a preoccupation with the school's present, not the present of the adult coming out of the school) is nicely illustrated by this comment from Morton Alpren's preface to *The Subject Curriculum: Grades K–12*:

> Because it seems more important to render a service to today's schools than to guess what schools of the 1980's might be doing, we sought to be as practical as possible. We sought to make direct application to the commitments made by the nation's schools today. (p. ix.)

[9] The passage by C. P. Snow is quoted on page vi of *Search for Alternatives*, edited by Franklin Tugwell.

Educating for a Changing World

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> People in every generation think they are living in a time of transition, and of course they are quite right. But I think we can claim to live at the confluence of more historic transitions at once than any of our ancestors.
>
> Think comprehensively, for a moment, about the macro transition we are in. It comprises a variety of changes in beliefs, loyalties, fears, aspirations, doctrines, and assumptions about personal and national futures. The transition simultaneously reflects changing concepts of security, changing concepts of growth, and changing concepts of equity (or "fairness"). (Cleveland, 1981, p. 5)

Certainly much has been said about the rate at which the world is changing around us. Alvin Toffler popularized this notion in his widely read book *Future Shock* (1970). Some social commentators, like Harlan Cleveland, argue that current changes in Western culture are among the most significant in history. Kenneth Boulding has called today the second great "watershed" (1964), Willis W. Harman sees a coming "transformation" (1976), and John Platt has cited a "crisis of crises" (1974). It might be valuable to examine some of the dominant trends which are driving this general social change. These trends are by no means autonomous and distinct, nor are they the only areas in which massive changes are occurring. They do provide, however, an idea of the pervasiveness of the change around us, and they illustrate some of the impacts of the waves of change that are washing over us.[1]

Until the 1840's, communication throughout the world could be most quickly accomplished through the carrying of letters by foot or pony. Some cultures also used slightly faster—albeit less private—methods such as smoke signals and drums. Beginning with the telegraph in the 1840's, both the speed of delivery and the size of potential clients increased. By the early 1900's, the telephone had replaced the telegraph and offered the added attraction of rapid communication across the oceans. In the 1920's, radio and movies

added to our ability to communicate virtually instantaneously with enormous numbers of people. After World War II television burst onto the communications scene adding pictures to sound for live presentations. "During the 1950's, television swept into homes at a stupendous rate: In 1950, less than 10% of homes had television; by 1960, more than 90% of homes had succumbed to the one-eyed monster." (Cornish, 1981, p. 15). The delivery of television has recently expanded to include cable, satellite, and cassette. Warner Amex QUBE in Columbus, Ohio now offers a talk-back system with their cable franchise whereby the viewing audience can vote for contestants in shows, call plays during a semiprofessional football game, or respond to surveys. The BBC in London now has an electronic newspaper where people can request their computers to deliver the latest news and weather on their televisions, and the Columbus, Ohio *Dispatch* is beginning such a system. Similarly, Albany, New York is experimenting with electronic yellow pages. Some areas of Coral Gables, Florida have teleshopping where the customers can view products for sale on their televisions, order them, and have them delivered to their homes. The cost is automatically deducted from their bank accounts. It is estimated that by 1990, most Americans will have access to an average of 50 television stations for viewing, and at least two channels to broadcast. Within the last century there has been an increase in communications speed by a factor of ten million (Bowman, et al., 1978).

On June 14, 1951, as the fascinated public stared at the earliest televisions, the United States Census Bureau unveiled UNIVAC, the first computer used by an agency of the government other than the military. UNIVAC was eight feet high, seven and a half feet wide, and more than fourteen feet long. Today the simplest calculator has more capacity than that original UNIVAC. There have been many comparisons drawn to illustrate the incredible development of computer technology. For example, if airlines had progressed as quickly as computers, the Concorde would be carrying half a million passengers at 20 million miles per hour for less than a penny per person (Cornish, 1981). There is little doubt that the size and cost of computers will continue to decrease at least as rapidly as they have for the past thirty years. Already, computer scientists are perfecting the technology to dramatically increase the speed of information retrieval and decrease the space required to store information. There has been an increase in data handling speed by a factor of 10,000 in the last

century, and that will continue to increase. As computers become less expensive and more efficient, they become more practical for home and small business. In 1980 alone, the sale of micro-computers increased at a rate of 60%. More and more of the machines in our society are becoming "smart." We have computer systems in our automobiles, our microwave ovens, our typewriters—even our games and toys. Computers are fast becoming "people amplifiers."[2]

The mix of expanding communications systems and pervasive computer technology is creating an entirely new capacity for generating, storing, and using information. With more than half of the American work force now involved in working with information, the implications for continued growth in communications information technology are staggering. Many activities that previously required transportation—such as shopping—can now be done from the home. Already, many stockbrokers are conducting business from their homes rather than traveling to offices. Soon many people will have direct access to offices, shops, and agencies without leaving their homes. More and more entertainment will take place within the home through cable television and computerized games. While the savings in transportation costs and natural resources may be obvious, the possible costs of loss of direct human interaction are less obvious. Certainly, individuals will have greater demands placed upon them to cope with increasing amounts of information. Already some are seeing a need to examine the ethical uses of information and very possible abuses infringing upon rights to privacy and security. Numerous cases of "computer crime" have already reached the courts where individuals have gained access to secret codes resulting in the disappearance of millions of dollars of assets from banks or changes in grades at universities.

Research in the beginning of life, aging, and the mind/brain is challenging our basic assumptions about what is human, when life begins and ends, and how humans think, develop, and learn. Aside from the "normal" ways of creating human life, science has shown us that we can artificially inseminate humans successfully, and we can actually create a human in a petri dish by fertilizing an egg outside the body and returning it to the womb for the remaining gestation period. In addition to these successful experiments, scientists are making major breakthroughs in chromosome analysis and genetic engineering. Scientists in this field estimate that by 2000, such

devices as artificial wombs and placentas and such techniques as gene insertion, deletion, and correction will be commonplace. These advances could significantly reduce the number of children born with congenital or genetic diseases.

Research in aging is having similar success. Gerontologists feel that it is well within the realm of possibility that people born in the last fifth of this century will have a life span of 120 years or more. This optimistic forecast is based upon research that has been able to enhance the repair process of DNA and upon the discovery of a "supergene" associated with the immune system, which seems to control much of aging. Concurrently, medicine is making great strides in increasing the success of transplanting such body parts as kidneys, hearts, and veins and in creating artificial body parts for implanting in humans. Further, as a society we are becoming better educated about the care of our bodies, most recently illustrated by the growing popularity of "wellness" counseling. The result is a "fitness revolution" where we are beginning to spend as much time and effort preventing diseases as we are in curing diseases. The cumulative effect of all this research portends a dramatic increase in life spans for individuals in our society.

Some of the most fascinating research in the biological sciences centers on the human mind/brain. For example, split brain research (the examination of the apparently distinct functions of the right and left hemispheres of the brain) has been going on for more than ten years.[3] The left brain apparently is the rational, linear part of the brain and it produces empirical, inductive, analytical modes of thought. The right brain is the intuitive artistic side, and it produces spatial, holistic, and simultaneous modes of thought. The April (1981) issue of *Psychology Today* reported research that indicated this split appears to be true for the emotions as well. The right brain controls the depressive, catastrophic emotions and the left brain handles euphoria and indifference. Other research is continuing into how the mind works and where certain capacities and emotions and thought processes take place. Research by Connie Toepfer and others into how the brain develops is also revealing important results.[4] These researchers and surgeons believe that the brain has a variable rate of growth, and that at certain ages it reaches plateaus. The two most significant plateaus seem to be around ages 8 or 9 and between the ages of 11 through 13. During these plateaus the brain is less likely to be able to learn new concepts and abstract thinking skills. The use of

such techniques as biofeedback and hypnotism to control pain and enhance learning continue to draw the attention of the scientific community and the public. Research in the chemistry of the brain is growing apace. For example, the National Institute of Mental Health has created a synthetic drug based upon vasopressin that can significantly enhance short-term memory. In tests with college students, the use of the drug improved scores on simple memory tests by 20%. In a test with depressed women of middle-age, scores were improved by 50%; further, 33% of the women showed substantial relief from their depression.

Many of the developments briefly cited here—obviously only the tip of the iceberg of biological research/engineering—raise new ethical and practical issues. Individuals are beginning to have choices which they have never had before. We can only begin to consider the possible effects on individuals, on relationships, and on our society.

The changes in our world are not limited to technological research and development, but also include—perhaps even more importantly—emergent social trends which will certainly affect our students as adults and which we are beginning to feel even today. As noted earlier, the shape of our economic society has been changing rapidly over the past century to the point that it is no longer based on the production and distribution of goods, but on the processing and dissemination of information. In fact, the high point of American work force employment in manufacturing was 1920 with 53% so employed, while 28% of the work force was employed in agriculture and extractive industries, and only 19% employed in information, knowledge, and education. By 1976, 4% of the work force was involved with agriculture and extractive industries, 29% in manufacturing, 50% in information, and 17% in other services. It is estimated that by the year 2000, 66% of the work force will be involved with information (Moliter, 1981). This change in the types of employment coupled with the use of computers and computerized robots in manufacturing is creating dislocation in society. Gabor has argued that while we replaced the jobs attainable by people of low intelligence in the late 19th and early 20th centuries, we are now in the process of destroying the employability of the average person. In addition, the increased life span discussed earlier will have substantial impact upon the economic society. Already, the increasing demands for social security and other retirement benefits have led to what appears to be less liberal retirement policies. Keeping people in jobs longer

may spell the end of prospects for rapid promotion of younger workers.

Major demographic shifts are occurring in our society as well. The well-publicized shift of population from the industrial cities of the North and the East to the cities in the South and the West will result in a loss of anywhere from 12 to 17 seats in the House of Representatives for the states of the North and East. The South and the West are also the recipients of the majority of immigrants, refugees, and illegal aliens. Immigration authorities report that over 12,000 illegal aliens from El Salvador alone were caught in 1980, and that 1000 Mexicans a day are *caught* trying to enter California illegally. Because of immigration—both legal and illegal—and because of the generally higher birth rate among minorities, California will have a majority of minorities by 1982; i.e., there will be more minorities than whites. Hispanics are expected to replace blacks as the largest minority in the United States by 1990.[5]

Not only is our society moving South and West and changing into a more pluralistic society, it is also becoming older. In 1980, there were 28% more people over the age of 65 than in 1970. In the last ten years alone, the median age in our society has risen from 28 to 30. Not only are people living longer, but also women have been having fewer children. In 1955, a woman of childbearing age could expect to have 3.7 children. In 1977, that figure had dropped to 1.8 children per woman of childbearing age. This trend may be reversing to some degree, however. Since 1976 there has been a 9.5% increase in births. The census estimates the 1990 pre-school population at 37% more than in 1978. 1980 saw about 3.5 million births, up 2% from the previous year and the most in any year since 1971.

One of the most significant changes occurring in our society is the changing structure of the family. In the United States today, one half of all marriages end in divorce. Less than 10% of families today are traditional (father working, mother at home tending one child or more) and 14% of all families are single-parent families. More and more people are living alone, 66% more than in 1960. Attitudes about marriage and children are also changing substantially. In the late 1950's most single women assumed that they would get married and have children. Yankelovich (1981) found that 80% of the people he surveyed in 1959 felt that anyone not wanting to get married was either "sick, neurotic, or immoral." By the late 1970's these condemnatory attitudes had shrunk from 80% to 25%. Now, 83% of

Americans believe it is acceptable to be married and not have children, and 75% say it is morally acceptable to be single and have children. A majority of American women are now working outside the home, and two thirds of them say it is as much for self-fulfillment as it is for economic reasons. An indication of the changing role of women in our society is the rising enrollment in nursery schools. During the 1970's the actual number of 3 and 4 year olds declined by 18%, but nursery school enrollment rose 71%.

What we have is a picture of a society changing dramatically—not in the distant future, but often more quickly than we are able to collect data and plot the new trends. What appeared certain only a few years ago, such as the continued decline of the United States birth rate (and a continued rapid rise in the overall birth rate of the world), appear no longer to be so probable. Further, many of the basic assumptions of our society are succumbing to the technological wizardry of computer scientists and biological engineers. Even preparing youth to get jobs is not as simple as it once was, as jobs are born and die in less than generations, and the idea of a job "for life" disappears. Families splinter and recombine in new arrangements. Daniel Yankelovich notes that while "in any culture there will usually be more continuity than change" (1981, p. xvii), both continuity and far-reaching change can and do coexist in American society. For Yankelovich, the key question is "Have the important things remained the same, or have *they* changed? If important things have changed, . . . they will overflow the confines of culture and flood into our economic and political lives as well. And, if they are important enough, they will break the continuity of American experience in decisive ways" (1981, p. xvii). Like Harman and others noted earlier, Yankelovich contends that American culture is in the midst of a major transformation:

> Indeed, so far ranging are these changes that each time I encounter them a recurring image comes to mind, the image of the earth moving deep beneath the surface and so transforming the landscape that it loses its comfortable familiarity. According to the geological theory of plate tectonics, giant "plates" undergird the earth's surface and keep it stable and rigid. Sometimes these immense geologic formations, grinding against one another beneath the surface of the earth, shift their positions. Their movements may be slight, but the plates are so massive that along their fault lines even slight shifts cause volcanoes and earthquakes on the surface.

> Increasingly in recent years, our studies of the public show the "giant plates" of American culture shifting relentlessly beneath us. The shifts create huge dislocations in our lives. Those living closest to society's fault lines are the first to be thrown into new predicaments. But even those living at a remote distance feel the tremors. (1981, p. xiii–xiv)

While many social institutions are currently feeling the effects of the massive tremors coursing through society, institutionalized education—in the form of the nation's public schools—seems among those perched on the "fault line." In its efforts to properly train youth for careers, education is often among the first elements of society to confront changing economic conditions and demands. Further, American education has long been considered one of the primary tools for correcting social ills and for elevating both the population at large and specific social groups; the desegregation efforts of the early 1960's and Head Start are two of the more obvious examples. Even the foremost critics of public education—at present, the intensely vocal fundamentalists and moral rightists—argue not with the potential of education for changing society, but with the direction of that change. From the perspective of basic cultural and societal dynamics, education plays a central role in any society: education is the composite of processes by which generations prepare succeeding generations to continue the society. Throughout history and across cultures, education may be seen most simply as a replacement mechanism by which the society ensures its own survival (Mead, 1943). In times of little change, this task is usually best accomplished through the transmittal of traditionally successful skills, values, and beliefs. These processes are usually evolutionary and often escape the notice of individuals in the culture. Any changes become evident only upon careful retrospection. In times of change, however, societal survival is predicated—as is survival for the individual—upon successful adaptation to the new conditions. In such situations, education must prepare individuals with appropriate skills, values, and beliefs for these new conditions, thus eventually transforming the society into a more suitable state. This successful adaptation requires responses in a society over a much shorter time span, bringing the demands to the attention of the society. In such an instance, education would face both immediate and incredibly complex responsibilities, and with public scrutiny of its efforts.

American society is confronted by just such a situation today, and education—on the fault line of change—is feeling the effects. Socie-

ty as a whole, and the individuals within it, are becoming aware of these shifts in the "plates," and many are looking to education (although not completely to public schools) for much of the solution. Unfortunately, education has tended to respond with a series of "innovations" which, while interesting and perhaps helpful on a small scale, have failed to address the essentially systemic nature of the problem. For education to successfully fulfill its social mandate, for it to assist individuals and society alike in responding to the demands of a rapidly changing world, education must attend to the immediate changes of the near future and look seriously at potential developments in the more distant future. At the very least, Donald Michael contends:

> We must put vastly more emphasis on educating for certain intellectual abilities. We must educate people to have long-range perspectives, to think in terms of many variables related to each other as probabilities rather than certainties and related as both cause and effect of each other. We must educate for logical skill in recognizing and working through the ethically and morally tortuous dilemmas implicit in the assignment of social priorities and in the risks involved in seeking to attain them. This logical skill must be complemented by deep familiarity with the history of ideas and of comparative ethics, since the recognition and resolution of ethical issues is as much a matter of extrarational factors—historical accident and traditional values—as of purely rational assessments. We must educate so people can cope efficiently, imaginatively, and perceptively with information overload. (1968, p. 108)

As John Goodlad has pointed out: "Ours is the first generation to have achieved the Socratic wisdom of knowing that we do not know the world in which our children will live" (1973, p. 217). The argument for the uncertainty of the future—other than that it most probably will be different from today—is compelling for educators, because it raises a significant question: If we have little idea of the world our children will inherit, and thus little idea of its demands, how can we determine what skills, values, and beliefs will be most useful and applicable? On one hand, education for the future must be based on serious attempts to reduce the uncertainty of the future through careful exploration of possible, probable, and preferable states of affairs. On the other hand, education for the future must accept uncertainty and attempt to assist individuals in developing "internal anchors" which will permit them to survive and to promote the survival of the society regardless of turns of events. As Michael

noted earlier, an essential such "anchor" consists of skills with information, and skills in decision making and problem-solving, as well as the capability to communicate effectively and to be receptive to the communication efforts of others. We are beginning to understand that in a world where information and knowledge are increasing dramatically, the appropriate focus of education is not how much information an individual can store, but instead the competency to locate, evaluate, and synthesize information according to need. Further, as the fate of societies and of humanity itself often hinges on the ability of individuals to express ideas and feelings cogently to others, education must emphasize all aspects of communication, including an understanding of the uses and potential abuses of communication technology.

Another such anchor focuses not so much on the skills necessary to function in an uncertain and changing world, but more on a way of viewing the world. It may be called a perspective with an orientation toward the future. This perspective emphasizes the power of the future for the individual and the responsibilities of the individual for that future. There are certain elements of the perspective which are especially crucial for individuals. One is the understanding that a number of alternative futures are possible both for individuals and for society. With alternatives come choices, and with choices comes the need for purposeful action. Bertrand de Jouvenel states:

> What is important is to find points of fulcrum on which we can exert pressure, thereby deflecting the course of events in one direction rather than another. . . . We want to forecast in order to act. (1967, p. 113)

Another element of this "futures perspective" is the idea of holism. Holism implies that individuals, consequences, systems, and events are all interrelated, and that no action should be taken without regard for its effects. Of special interest, of course, are the effects of such actions on the human beings who might have a stake or interest or share in the action—the "stakeholders." Because all decisions in the present reflect some image of the future, images are the key to all choice-oriented behavior. At times, such images help to shape what will happen. Finally, because the consequences of our actions now are extending thousands of years into the future, as in the case of chemical wastes and nuclear wastes, individuals need to extend their time frames so they may consider the long-term consequences of their actions.[6]

By no means are these the only "anchors" necessary for individuals to survive in a changing world, nor will the inculcation of these anchors in individuals guarantee the survival of our society. However, it seems clear in light of the changes in the world catalogued earlier in this paper that our inflexible educational system, based upon an industrial society and responding to the "changing plates of culture" with band-aids, is not sufficient for preparing succeeding generations to continue society. Education's most appropriate response may well be that first suggested by Margaret Mead almost four decades ago:

> Instead of attempting to bind and limit the future and to compromise the inhabitants of the next century by a long process of indoctrination which will make them unable to follow any path but that which we have laid down, (I suggest) that we devise and practice a system of education which sets the future free. We must concentrate upon teaching our children to walk so steadily that we need not hew too straight and narrow paths for them but can trust them to make new paths through difficulties we never encountered to a future of which we have no inkling today (1943, p. 639).

Notes

[1] Credit for popularizing the metaphor of change as waves goes to Alvin Toffler and his book, *The Third Wave* (1980).

[2] Earl Joseph, staff scientist and futurist for the Sperry-Univac Corporation, was first to coin the phrase "people amplifiers" for the wide range of electronic, and primarily computer-oriented, devices which we are developing to assist individuals—beginning with the simplest hand-held calculator.

[3] Robert Ornstein's book, *Psychology of the Consciousness* (New York: Penguin Books, 1972), is one of the first to examine this research and its implications.

[4] For an excellent collection of research in this area, see the 77th Yearbook of the National Society for the Study of Education Part II, *Education and the Brain* edited by Jeanne S. Chall and Allen F. Mirsky, University of Chicago Press, 1978.

[5] These demographic changes are beginning to reflect geographical/subcultural characteristics so distinct that Joel Garreau in his book *The Nine Nations of North America* suggests the people of North America are beginning to act as citizens of nine separate nations (New York: Houghton Mifflin, 1981).

[6] For a more complete explanation of this perspective, see Fletcher, Geoffrey H., "Key Concepts in the Futures Perspective." *World Future Society Bulletin*, January–February, 1979, pp. 25–32. That such a perspective can be taught successfully is one of the results of a study we conducted in 1979. For more information, see Wooddell, Gary D., Fletcher, Geoffrey H., and Dixon, Thornton E. "Developing and Evaluating a Futures Study Curriculum for Ninth Grade Students," unpublished doctoral dissertation, University of Cincinnati, 1979.

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Educational Priorities for the Not-So-Gay 90's

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Imbalance between what people know how to do and what is needed, social strife, continuing acceleration of technological advance, dangerous stress on resources and the economic system, environmental destruction, the information explosion, and political unrest are among the current forces which have important ramifications for the future of education. They prevent us from looking with optimism at the future of education and culture. Many fear that the closing decades of the present century may find most of the people on the planet Earth worse off than they were at mid-century. Still, the potential for superior achievement and a better human environment than we have ever known does exist. There is the bright promise of fulfilling the human potential, and education is the best tool we have yet invented for making the promise real. This paper examines some of the priorities that must be established if a better society and individual fulfillment are to be realized.

I have chosen to deal with educational priorities for the 1990s for two reasons. First, decisions about educational policies of the 1980s are already set. Education is always influenced by the tremendous momentum of past traditions while institutions like schools resist rapid implementation of innovative ideas. Present trends such as "back to basics," the abandonment of programs for social reconstruction, apathy toward equal educational opportunity, business model accountability, and a narrowing of the curriculum in the name of quality, are efforts to turn back the clock at least twenty years. In the long run, these trends will do little to alter the low state of esteem into which modern public schools have fallen. Nevertheless, these forces now in operation together with massive institutional resistance to change, will certainly shape pedagogical policy through the current decade. By 1990, I believe, it will be painfully apparent that these trends will have failed to meet the needs of the people or to

provide schools (if, indeed, schools survive) which can adequately prepare young people for their futures.

A second reason is that future priorities must of necessity be speculative. We can never actually know the future until it becomes the present and slips suddenly into the past. It is common knowledge that the rate of change in the industrial world is moving on an exponential curve. What is sometimes overlooked is that social inventions lag far behind careening technology so that the cultural fabric is stretched to the breaking point. It is therefore risky to project cultural change into the remote future. Writers who describe education in the year 2,000, the third millennium, or the middle of the twenty-first century must be so removed from current reality that they deal in fiction. Scenario and science fiction authors who describe life and learning in the far future may serve a useful purpose in stimulating though, but a span of ten to fifteen years is about as far as we can go in linking present realities with plausible futures. Of course, children now entering kindergarten may be expected to be alive and active in the middle years of the twenty-first century unless our policies totally fail and permit some disaster like global nuclear war. Priorities and trends established in the 1990s will probably determine the survival, success, and well being of these future citizens. If the next century is as different from the present one as the twentieth century was different from the nineteenth (and surely we can expect even more dramatic alteration), the task of preparation will be of Herculean proportions. At the very least, we must avoid sending people into the twenty-first century armed only with an education which is based on a rear-view miror image of the ninteenth century.

A great deal of the literature of futurism dwells on the breadth and depth of our societal problems and the fatal traps that must be avoided if the future is to be even as desirable as the past. Certainly the world political, social, and economic conditions suggest that all will not be rosy in the 1990s. There is a chance, however, that human beings may achieve a higher level of fulfillment than ever before in history. New possibilities for human achievement occur only when new habits of living and long established traditions are challenged by changing conditions. An education which can prepare for new horizons is realistic if we have the intelligence and the integrity to invent the kind of future that will permit and sustain greater human development. There is truth in the symbolism of old Chinese writing which

combined the character meaning danger with the one for opportunity to create the word "crisis."

Also central to the task of producing a better future through education is faith in ability of individual human action and collective effort to resolve problems and create better opportunity. The ancient Athenians of the age of Pericles believed in the ultimate intelligibility of the universe. They thought that nature of man and of existence itself was knowable, and that understanding natural forces would give them the power to control the world. The decline of the Greek city states in Hellenistic times was marked with an attitude of uncertainty which Gilbert Murray described as "the failure of nerve." Those who set priorities for education in the 1990s and beyond must resist the tendency to think that human action really cannot control the world and that the future is beyond the understanding of the human intellect. For educational policy, there can be no failure of nerve. History is shaped by people even in times of deep stress when individuals may feel that they are the pawns of forces beyond their understanding and control. The inability to envision a future better than the present is a failure of the imagination (which must be avoided like the plague).

Of course many futurists take issue with the idea of progress leading to ever greater production of consumer goods, the expenditure of enormous quantities of fossil-based energy, the rapid depletion of non-renewable natural resources, and the development of world-wide markets for materialistic items such as personal automobiles. They say it will be very difficult to maintain peace in the face of local despotism, disregard for human rights, and the arms race between growing numbers of nations with the ability to make nuclear war. The rich-poor gap continues to grow along with vast increases in the populations of nations that are unable to provide even the most basic services or to guarantee freedom from starvation. Fully one third of mankind currently suffers from want, malnutrition, or insecurity about how they will obtain their next meal. Obviously, hungry people have no energy for education, fearful people do not seek harmonious personal integration, and the oppressed have little zest for developing their talents. Yet it is true that vast numbers of people have already achieved basic needs for security, freedom from want, and freedom from political oppression.

The potential for resolving the most basic human problems for the remainder of the population has never been greater. A continuation of

international strife, apathy toward human misery in remote areas, and even greater materialistic conspicuous consumption in the developed nations is a blueprint for disaster but it is not beyond the capacity of human beings to alter these trends. If they are altered, the opportunity for the future of billions of people is so bright as to stagger the imagination. An excellent case can be made that improving world wide conditions for all people and striving to achieve the maximum achievement of human potential in technologically advanced nations are closely associated goals. A shift of attitude away from exploitation, consumption, competition, and the production of goods might benefit all.

Most Americans already have freedom from want, though not freedom from greed. We have accepted as a realistic goal the idea that ordinary women and men can achieve the good life in materialistic terms. Luxuries beyond the dreams of the most wealthy and powerful kings in history are now within the reach of the most pedestrian citizens. Having a table set with exotic fruits grown thousands of miles away, the ability to travel vast distances at fantastic speeds with relative safety, and the absolute command of legions of household "slaves" at a flip of an electric switch are examples of such luxuries. Yet many Americans have no concept of a life-style on any higher plane than materialistic well-being, luxury, recreation, and entertainment.

If we are to seek purposes beyond affluence, values beyond technology, and visions of the good life beyond material prosperity, these purposes, values, and visions must be found in ourselves. As Bowman has aruged, too many of us seem to be waiting for some new prophet to create a utopian vision for us. We seem to be waiting for Godot. Designing a better future requires that we extract ourselves from exclusive concern with the surrounding environment and think about long-range possibilities. A limited training program only contributes to myopic perception and restriction of our ability to think in terms of fulfilling potentials. It seems quite impossible to think that a group of narrowly trained specialists will be able to identify viable educational priorities for the 90s and beyond. We know specialization is necessary for the future, but we must also have broad general education with depth and rigor. I am much impressed by Marshall McLuhan's argument in *Understanding Media* that in education, the conventional division of the curriculum into subjects is already as outdated as the medieval trivium and quadrivium after the Renais-

sance. Any subject taken in depth at once relates to other subjects.

Throughout history, only a small portion of the population had the wealth and the freedom to pursue human fulfillment. Before the agricultural revolution, there was insufficient food available to free any group from the necessity of devoting their full attention to acquiring the "staff of life." Agriculture, together with the domestication of animals, made possible social classes, cities, cultural advance, and civilization. The many continued a life of toil but the few were able to pursue other goals. In nineteenth-century America as in Periclean Athens, a small number of people were free because they were supported by the labor of the masses. Only modern machines and technology have allowed for the possibility that large numbers of people might pursue the higher goals of human fulfillment. This happy situation does not yet apply to everyone in the highly developed technological nations and certainly not to the third world, but the means to make it a condition enjoyed by all of the planet's people is within our grasp. It is not enough to bring Japanese or American affluence to everyone. What we must do is establish educational priorities based on the premise that a much superior human condition can be achieved.

The utopian imagination required for such a grandiose future is not being provided by educational theorists who focus on preparing children for the life conditions of contemporary society. It can hardly be drawn from philosophers who spend their time on the analysis of language or from business leaders who only desire a more efficient training system to feed the mills of industrial production. It is unlikely to come from political figures concerned with pleasing voters, from members of the moral majority who want to turn back the clock, or from professional educators who are good only at running systems and managing crises. If these priorities and the utopian vision are to be provided at all, leaders in education who are futurists will have to suggest them.

History indicates a long tradition in pursuit of the ideal of human wholeness (especially in Western tradition). The road to maximum realization of the human potential, however, is full of quagmires and detours. Consider for example the breakthrough made by the Athenians in the fifth and fourth centuries B.C. where the good life revolved around the *polis*. Individual achievement was admired and rewarded only as it contributed to the well-being of the community and the glory of the culture. Government, creative use of leisure,

beauty, literature, and the life of the mind were pursued by the citizens. Democracy flourished under Solon and Pericles. Philosophy soared to immense heights with Socrates, Plato, and Aristotle. Art and architecture blossomed in the Parthenon and the great works on the Acropolis supervised by the sculptor Phidias. Immortal poetry was created by Aeschylus, Sophocles, and Euripides. Military and political events were recorded for posterity by Herodotus and Thucydides. The Athenians were convinced that they had invented a culture and a concept of the good life far superior to anything previously known and later generations have tended to agree. All this was accomplished on an economic basis which was very weak by modern standards, and with very primitive technology. We now have the power to provide a support system equal or superior to that enjoyed by the citizens of ancient Athens for all people on earth. The life of leisure, beauty, and intellectual activity for all is within the grasp of men and women everywhere, if we have the courage and the vision to demand it.

It is good to remember that while Athens was rising to a high level of human fulfillment, contemporary societies existed on a basis of fear, misery, and man's inhumanity to man. Persian kings and nobles considered all other people to exist only for their pleasure and they killed, plundered, and raped with impunity. No concept of human rights or dignity existed in Oriental states, or indeed, in most of the world. The Spartans developed fantastic military power and a patriotic *esprit de corps* still admired, but they did it at the cost of freedom and intellectual development. There are no remains of beautiful buildings in Sparta, nor did the Spartans produce philosophers and literary classics.

Athenian success at defeating the Persian hordes astounded even themselves, but it set the stage for rapid decline. Athens developed a league of independent city states for the purposes of defense against further Persian aggression, but it quickly became an Athenian empire. Athens changed from the champion of freedom and independence to a powerful master city, demanding gold and absolute obedience from her vassals. Wealth and power brought social revolution, demagoguery, materialism, cosmopolitan attitudes, and sophistry. At the end of the disastrous Peloponesian War, the very foundation of classical Athenian culture was destroyed and the way was paved for the empire of Alexander. Athens in its golden age still serves as a model of what humans can achieve if they have the

imagination and can control a sufficient number of life conditions. Future educators can use this model, but they will do well to recall how quickly the ancient glories turned to despotism, tyranny, ashes, and dust.

For all the advancement toward a better society, there has been an opposite and often stronger movement toward slavery and exploitation. James Cavell's popular novel *Shogun* is an excellent description in medieval Japan of the attitude of the nobles and warlords toward their subjects and those who could not defend themselves. The history of Nazi Germany and more recent conditions in Southeast Asia bear witness to the fact that sophisticated technology and scientific invention do not guarantee a utopian future. As Maslow has pointed out, the path toward self actualization and the highest human achievement begins with satisfying basic needs. But even those who have food, safety, freedom, and security will not automatically strive to reach higher goals.

If the good life is defined in materialistic terms only, if values are taken from norms presented through the medium of television, if education is directed toward mere job training, and if no stimulation or support for the conceptualization of life on a higher plane is provided, there is little hope for a better future. Of course it is necessary to solve the basic human problems for all people and to provide training for scientists, engineers, physicians, communications experts, systems theorists, and the like. But these goals, if achieved, merely provide for a continuation of the present industrial era with more equity of distribution of resources. They do not assure a smooth transition into the post-industrial society, the information age, the era of communication, the learning society.

What kind of future does lie beyond affluence, material prosperity and technological advance? To speak of "human wholeness," a high degree of "personal integration," or "development of the human potential" is to use terms that are vague. Educators used to specific goals expressed in behavioral terms are uncomfortable with such imprecise and general aims as "human fulfillment." Such aims are not quantitative and do not lend themselves to the reductionistic standards of accountability. The focus of the 1980s on basic skills and information is much easier to specify. Pathology always being easier than cure, educators are likely to look for the obstacles to fulfillment and self-actualization instead of finding ways to achieve these goals. Certainly the momentum of the industrial, production-oriented,

materialistic, job-training, business-directed educational responses will not be easy to overcome. Yet even the most pragmatic educator who wants to produce students who will be successful workers in the present industrial era is aware that future needs and possibilities may be different. I believe we do not have to be precise about future aims if we build a wide foundation.

Nine Educational Priorities for the 1990s

I have identified nine educational priorities that need to be implemented in the 1990s if we are to achieve the goals required for a fuller development of the human potential. Others will no doubt make a case for additional policies and aims, but these nine are vital to a viable future. They are priorities in the sense that they must be given precedence over the programs and goals of the 80s. It is not suggested that all of our existing policies be discarded, because the future learning society will have room for a wide range of educational experiences. It is argued that these priorities are essential to the task of reaching a higher level of human development and a better society for the world of tommorrow.

1. *Learning to learn efficiently.* People throughout the industrial era devoted the early part of their lives to formal education and followed it with a longer period of work and leisure. By 1980, however, it was apparent that learning and working were activities that required a life-long relationship. Highly trained technicians and professionals were required to keep on learning because their skills and knowledge rapidly became obsolete. Most people in the 1980s realized that they would need to retrain several times to prepare for new jobs of quite a different nature or to keep up with innovations in their fields. Formal education began to blend with informal learning experiences, while specific training for work and general education expanded beyond the years of youth. By 1990 it will be understood that both formal and informal education are lifelong activities that cannot be separated. Learning for leisure, for solving social problems, for new careers, for avocations, and for intellectual stimulation will be accepted as the activities which occupy the greatest part of each human life. Teaching and learning are so vital in an era when access to unbiased information and knowing how to use it are survival skills. Learning how to learn quickly and efficiently must become a matter of highest priority. Any activity which continues throughout life should be mastered as well as is humanly possible. Educational

institutions must find ways to avoid the boredom, apathy, inhibitions, and wasted time that characterized earlier schools. The learning society will appreciate the need to provide additional resources for this purpose but it will not tolerate failure. Future societies cannot afford citizens who are less than expert at the lifelong task of learning.

2. *Developing skill in evaluation of materials and ideas*. Students in the 1990s will regard it as curious that learners in schools once thought that teachers and textbooks were unquestioned authorities. They will learn early to depend on sapiential authority which is Robert Theobald's term for judging knowledge by its use value rather than its origin. An effort will be made to understand that many deeply rooted concepts such as the idea of justice were developed when only a few people had the freedom to pursue their own goals. Such concepts must be re-examined in the light of new social and economic realities. For education to work as an instrument for shaping the future, it will be necessary for everyone to learn how to evaluate the "truth" and the usefulness of ideas, as well as their sources. Literary exercises like checking one account against another and the comparison of various interpretations will be supplemented by computer-based checks of validity. Priority should be given to skill in critical viewing, as well as critical reading and listening. No person in the 1990s will be educated unless she or he has learned to detect subtle psychological persuasion, false logic, emotional appeals, and similar tricks used to make people believe what is not true. The argument of Postman and Weingartner that all students need a built in "crap detector" will become policy in the 90s.

3. *Education to deal with the unknown*. Throughout the history of education, students attended schools to learn what they did not know from teachers who presumed to know. A grave error in traditional education was that it gave insufficient attention to fielding problems for which there was no known answer. While scientific training provided a foundation for discovering or inventing new knowledge, many learners emerged from schools with little skill in inquiry or in probing for new answers. The last decade of the twentieth century must focus on working together to deal with probabilities and uncertainties. Experts may be used to clarify aspects of problems, but many of the most significant human and societal difficulties cannot be resolved by experts alone. Learners need to work with possible alternatives and experiences in synergetic activities. Synergy stresses

the way in which each unique event or system affects other events and systems. Students need to think of learning as a technique of cooperative problem-analysis and the sharing of information resources. The delphi method must be practiced and better communication methods must be learned. Such educational activities require that people be willing to make mistakes and risk being wrong. As George Leonard has argued, learning means that the student must be prepared to change and have his or her prejudices altered. Future education will fail unless it moves away from exclusive treatment of what is well understood toward helping students cope with the unknown.

4. *Encouragement of diversity*. The United States is quite fractured along racial, ethic, regional, and class lines. Global society is even more fragmented. Our educational tradition of teaching patriotic nationalism, Americanization of the foreign born, and conformity to middle-class values is inadequate for the future. In the past, we have been barely tolerant of diversity and great opposition arose to building a truly integrated society. By 1990, world conditions will surely demand an end to excessive uniformity, homogeneity, and sameness. Distrust of everything different, strange, foreign, or new has no place in a pluralistic world. Multicultural understanding and social diversity is to be encouraged in a world which grows smaller while pressures on resources increase. The days of isolation, extreme nationalism, and prejudice against ethnic groups must end if human fulfillment is to be achieved. A priority for future education must be to encourage understanding of diversity and to build greater tolerance for the "alien" ideas of people from other cultures, nations, and races.

5. *A better understanding of human nature*. Schooling has always been influenced with the dominant conceptions of human nature. Rousseau's view of the child as basically good stands in opposition to the bad/active nature defined by Calvin or the passive/neutral theory of B. F. Skinner. A very important priority for the future of education is to discover more about human nature in order to educate for greater human potential.

William James once said that a healthy human being is only functioning at about ten percent of his or her capacity. Gardner Murphy reinforced this argument in his book *Human Potentials*, and thus started a new movement. Abraham Maslow and Carl Rogers agree that very few of us are stimulated and supported so that we reach our highest capacity. It is generally agreed that people learn, grow, develop, and are creative according to the kind of physical

surroundings and psychological environments they enjoy. Punishment, negative conditioning, and having our errors constantly pointed out to us may inhibit our progress. It may well be true that the human capacity is infinite. We do know that the whole person has a capacity for zest, passion, exuberance, and commitment. Fulfilled human beings retain contact with deep passions, but also remain sensitive to ethical considerations. Well integrated people have a capacity for openness, an interest in new ideas, and responsiveness to others. If future education is to encourage the development of higher human potentials, education must foster understanding of human nature and provide for the support of individual growth.

6. *Socialization on a broad basis.* Traditionally, education has served two distinct functions. One is teaching basic skills, processes, and information necessary to function in the world, providing the foundation for future learning. The other is to pass on the culture to a new generation through socialization and enculturation. The latter function is a means of ensuring the unity and survival of society. It provides patterns of behavior for individuals and groups, teaches mores and rules of behavior, and furnishes models or norms for accepted actions and beliefs. American schools have long been a major institution for perpetuating and maintaining the culture. A priority of the 1990s must to be broaden socialization to include a wide range of alternatives. If individuals learn to conform to cultural patterns that reflect only a small slice of humanity, they will be ill-prepared for a global culture. It is not necessary that socialization be limited to any one single unique pattern or system of values. In a period of accelerating change and the interaction of people with different cultural backgrounds, it is necessary to learn the patterns of behavior of a great many different societies. Past ethnocentric attitudes must give way to a comparison of different cultural values. Sociology, anthropology, and ethnology may be used as tools for such general socialization.

7. *Education for value formation.* Closely related to the need to widen the foundation for socialization is the requirement that future education contribute to value formation. Efforts to teach or to clarify values have not always been successful, and there is always the issue of what values should be taught. By 1990, it will be imperative that the process or the way in which values are selected and internalized be well understood by students. This major task cannot be ignored by

educators merely because it is difficult or because it promotes controversy.

8. *Education beyond the training for jobs.* A materialistic society and an industrial-era mind-set have dominated educational policies for many years. School administrators often measured success by the numbers of students who entered the job market or a college which would train them for higher level occupations. Schools were criticized when Johnny could not read well enough to qualify for a position in business and industry, but there was little demand for Johnny to understand his own culture. It was assumed that people would spend a considerable portion of their youth preparing for work, and that formal education would end with the beginning of the work experience.

It is not suggested that work will disappear in the future, but it is suggested that the nature of work will change dramatically. Many occupations will cease to be needed while others will be invented. Rapid advances in science and technology will make it necessary to continue education throughout life in order to keep up with the new developments in each field of labor. Skills and information will become obsolete very quickly. As McLuhan put it, learning a living in the age of cybernation will be a lifelong process. As computers and automated machines take over much work once performed by human hands, the nature of labor will change. There will be more time to plan, create, design, and modify the environment. True leisure will replace the industrial era concept that time away from work is merely rest and recreation to prepare for more labor. By 1990, the concept of job preparation as specific training in early life will be as outdated as the mechanical adding machine. Education will be used to define new conceptions of labor and leisure, and to learn new ways of contributing to the well-being of the human race.

9. *Renewal of emphasis on general education.* I have found that few upperclassmen in my university classes know about Socrates, and some cannot even place him in history. Quite a few public school teachers have told me that they see no reason for teaching history, literature, basic sciences, or the humanities to students who will be truck drivers, mechanics, or construction workers. Narrow vocational interests have dominated schools to the extent that cultural understanding has been lost or ignored. There has been little concern for broad education that might help workers to be good citizens, creative

users of leisure time, community problem solvers, or fulfilled human beings.

A second reason for the decline of general education is the desire to begin specialized training very early so as to produce experts in specific fields. While it is true that experts are needed at present and in the future, it is equally true that experts have roles as people and citizens. Warnings against early and exclusive specialization have been found in educational literature for many years. Robert Hutchins made a profound argument for acquiring general cultural knowledge before refining that knowledge to specialization. Yet the values associated with the expert society and the pressure applied by writers like James Conant and Hyman Rickover caused general education to lose priority as compared with early and intense specialization. It was assumed that we could not afford the time and money for both, so the generalization/specialization argument took on an "either-or" configuration. By 1990, it will be clear that we cannot survive unless we do have both high quality specialization and profound growth in the quantity and depth of general education. The well rounded individual and the trained expert must be combined in each individual. A future learning society cannot be formed of narrowly trained experts who must be given their cultural priorities by others and who cannot understand the relationship of different fields. The really crucial decisions in the 1990s and beyond must be made by people with the best possible general education.

Education, Evolution, and the Future

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Schools are the genes of a culture. A society's schools are its means of passing information from one generation to the next. Just as genes pass on a family inheritance of information about how to grow a human face, so schools pass on information about how to create human societies. Just as the gene pool changes in response to adaptations to the changing environment, so schools and their curricula change to fit developments in human history.

This paper explores some implications of applying evolutionary theory to education. New developments in evolutionary theory provide insights on both the macro- and micro-levels of learning: both for trends in the educational system as a whole, and for a better understanding of individual cases—how Johnny learns, or doesn't.

While criss-crossing from learning to evolution and back to education, we will find everywhere the footprints of Gregory Bateson, who has been there before. The burden of his book, *Mind and Nature*, is to show how the evolution of species and the learning of individuals both fulfill the same set of criteria for what it is to be a mind. Bateson (1979) suggests, "that both evolution and learning must fit the same formal regularities or so-called laws" (p. 4). Both involve learning from mistakes, as well as their respective versions of positive reinforcement. Both education and evolution are systems for the propagation and incremental improvement of certain repositories of coded information. As such, both contexts bear scrutiny from the fast advancing field of information theory, and both contexts can help us determine the meaning of the much talked about move from industrial society to a post-industrial information society.

With this much said about evolution and education, a preliminary word will clarify my approach to the third topic in the title: the future. For most of recorded history the future has been pretty much like the past. One generation could train the next to carry on in an environment that remained essentially unchanged. Traditions remained adequate because social patterns remained traditional. But the pace of change has quickened in this century. The increasing pressure of a

novel future has turned attentions toward the future, usually in an attempt to predict changes in the environment. The Club of Rome, Herman Kahn, and the authors of the *Global 2000 Report* to the President all rely on a method of projecting particular trends along trajectories established in recent decades, e.g. in energy use, demographics, and the depletion of natural resources.

At SRI International we take a slightly different approach toward future studies. Rather than attempting to predict the future—as if it were totally predetermined and knowable with the appropriate tools and methods—we acknowledge a high degree of randomness and unpredictability in the way history unfolds. The task of the futurist is not to play prophet or seer but to cultivate well-informed stances toward the future by considering different scenarios, each of which represents a plausible future. By building alternative scenarios one gains a sensitivity to how things fit together: how economics, politics, religion, science and technology co-evolve in an ecology where a change in one dimension affects all the others (and vice versa). The criterion for the usefulness of scenarios is not the correspondence of one scenario with some mythically determinate and predictable future, but the coherence among elements in each of several different scenarios. The exercise of testing the internal coherence of different scenarios, and comparing the relationships of different trends as they wend their interrelated ways through different contexts, engenders a sense of the structure of society that is different from the prediction of any particular terms.

Systematic thinking of the kind required to build internally coherent scenarios can be of use in addressing some of the problems facing educators. While my remarks will not include full-blown alternative scenarios for the future of education, I hope to show how several of the trends that look worrisome when extrapolated in isolation from an evolving environment may look a little less menacing when considered in the context of an environment that is changing in several ways simultaneously.

The first of the following three sections will set the stage with a review of some of Bateson's insights into evolutionary theory. The second will take up three trends influencing the future of education. The concluding section will marry the themes of education and evolution in a way that suggests an appropriate stance toward the future of education.

I

Bateson's contributions to both learning theory and evolutionary theory can be summarized in the form of a few fundamental insights that fit together into a systematic package. Such bundles of basic beliefs have come to be called paradigms. The Newtonian/Darwinian paradigm is not just a set of theories about certain mechanical and biological interactions. It is a worldview that influences the course of inquiry in fields other than physics and biology. Its basic tenets include:

- the denial of final causes in nature (i.e. things do not strive toward the fulfillment of purposes; only people do),
- a predilection toward atomism (i.e. simple indivisible entities are the basic constituents of reality),
- explanation by reduction (i.e. to understand a complex problem or organism, one need only divide and conquer: break it up into its simplest elements and deduce the features of the whole from the features of its parts).

The Greco-Christian paradigm ascribed purposes to particular things and to the cosmos as a whole. Aristotle explained falling bodies as "seeking their proper place." Future states explained past states in the sense that the mature oak tree, the actual oak tree, accounts for the behavior of the potential oak tree. Acorns strive to become oak trees. Potentialities strive to become their corresponding actualities. The cosmos as a whole, in the Christian worldview, manifests an order that is the result of God's plan. Disorder, entropy, is equivalent to the denial of grace. With heavenly perfection as the final purpose of human existence, the Greco-Christian paradigm regards education chiefly as a training for later and higher stages. Aristotle's philosophy of education has little sympathy for the apparent disorderliness of youthful play. Rather than regarding childhood as a stage of development with its own distinct dynamics and demands, his curriculum treated children as potential adults—not as actual children. The Newtonian/Darwinian paradigm expunged purposes from the cosmos. Falling bodies do not seek their proper places like children finding their assigned desks. And the number of biological species is neither fixed, as Aristotle thought, nor do the species evolve according to some divine plan. Instead evolution is the result of random mutations and the survival of the fittest. It's a dog-eat-dog world in which atomistic individuals fight it out in Hobbes' War of

each against all. The competition of the marketplace replaces the cooperation of the monastery as the model for the educational curriculum. Further, the denial of any all-embracing cosmic plan is reflected in the anarchy of the modern, secular curriculum. The fragmentation of disciplines and the proliferation of specialized subdisciplines mimic an evolutionary tree gone wild with branches of every conceivable shape of leaf and twig. What seed was this that grew to such monstrous proportions? Surely not a good Aristotelian acorn that "knew," like some tiny homunculus, that its destiny was a well-formed tree of knowledge.

Gregory Bateson comes on the scene as the son of a biologist. He is raised in the discipline of rigorous science, but like his father, who argued Lamarck's case against Darwinians, the young Bateson sensed something wrong in the aimless atomism of the Newtonian/Darwinian paradigm. His early career as an anthropologist offered insights into the systematic interactions of human culture. Then he found a rigorous language to express those insights when he began working with Norbert Wiener, one of the founders of cybernetic information theory. The core concept of cybernetics is that of the feedback loop. A thermostat in the living room feeds back information about the room temperature to the furnace in the basement. The system of furnace, room temperature, and thermostat forms a homeostatic, self-regulating system that seeks a proper room temperature whatever the weather outside.

In Bateson's writings the example of the feedback loop between thermostat and furnace serves as a paradigm case for a new understanding about how systems work, both human systems and natural systems. Cybernetics allows us to speak of systems "seeking" homeostasis without depending on transcendent purposes, divine plans or final causes. Further, the cybernetic systems approach permits an understanding of human beings as a part of nature without reducing human beings to mechanical assemblages of Newtonian atoms. Bateson's term for the emergent paradigm is "the pattern that binds." He overcomes the dualism of mind and nature, not by turning natural things into little minds, as Aristotelian metaphysics did, nor by turning minds into mindless machines, as the Newtonian paradigm threatens to do. Instead, Bateson's contribution to a new paradigm shows the way complex systems in nature fulfill the criteria for being purposive minds, while at the same time our understanding of mind is rendered more precise by the application of those criteria to

systems other than human brains. In short, Bateson can afford anthropomorphic readings of nature because he gives a naturalistic (though not a mechanistic) reading of anthropos.

Which brings us back to the initial metaphor, that schools are the genes of a culture. Genetic evolution is a learning system. Genetic evolution is the means by which a species learns how to survive in a changing environment. If we understand evolution within a new paradigm of information processing, that new understanding of evolutionary learning will shed light on the way schools can help a culture adjust to its changing environment.

While the fundamental tenets of Darwinian evolutionary theory remain intact, some slight modifications reflect and reinforce a new paradigm or framework in which Darwinian insights are to be understood. These modifications reflect a shift from an atomistic to a systematic view. Where the motor of evolutionary change was thought to be singular mutations that allowed particular organisms to survive and propagate (because their fitness was superior to their competitors'), a systems oriented approach sees singular mutations as only part of the picture. At least as important is the normal diversity that is manifested within the gene pool of a species. Theodosius Dobzhansky was chiefly responsible for discovering that, in evolutionary terms, the relevant unit of survival is not the individual but the entire species. The adaptability of a whole species is a function of the diversity represented among its varied phenotypes—the carriers of manifest characteristics like blond or brunette hair. A single mutation of genotype—a change in a single gene—is only one way of introducing diversity into the gene pool. In order to reintroduce purpose into nature, it is not necessary to think of a guiding hand that generates new improved models by forward looking mutations of genotype. It is sufficient to consider the way diverse phenotypes of one species interact with diverse phenotypes of another species.

For example, if old ladies prefer poodles to labradors, and medicine increases the population of old ladies, then the proportion of poodles will increase—without any change in the genetic materials of old ladies or poodles. One can imagine that if a particular ecological niche like an apartment building were overrun with poodles, some other residents might fight back, not by warring on the poodles, but by recruiting newlyweds to replace some of the deceased old ladies.

The microcosm of an apartment building already offers sufficient complexity and diversity to serve as a model for natural systems that

manifest fluctuations among different populations. From a classically Darwinian perspective, the spruce budworm is a threat to the survival of balsam fir. Further, the cycles of budworm infestation give the appearance of instability—a kind of boom and bust syndrome. But Jantsch and Waddington (1976, p. 15) have shown that, from a more systematic perspective, "these very fluctuations are essential features that maintain persistence of the budworm, together with its natural enemies and its host and associated trees. By so fluctuating, successive generations of forests are replaced, assuring a continued food supply for future generations of budworm and the persistence of the system." Survival of the system as a whole is supported by diversity in the gene pool over time. In place of the classical picture of a climax ecology with a stable balance among species, a more dynamic picture shows that the resilience of a pattern of cycles is one of nature's ways to maintain (over time) a rich diversity of genetic material.

Lest this mention of "nature's way" seem too purposive or anthropomorphic, let me repeat the new picture of finality in Bateson's works:

> The parallelism between biological evolution and mind is created not by postulating a Designer or Artificer hiding in the machinery of evolutionary process but, conversely, by postulating that thought is stochastic [—that is, containing both a random element, and a filter for screening out some elements to allow preferred elements to remain] . . . I would emphasize that *creative* thought must always contain a random component (1979, p. 182).

Bateson's appreciation for the role of randomness in league with opportunities for cooperation among different species contrasts with both the view that takes cooperation as "things working out for the best or according to plan," as well as the view that casts random mutations in a context of competition among individuals rather than cooperation among species. The emergent paradigm of rationality, as it is evident in evolutionary theory as well as other disciplines, has implications for the future evolution of education. In the next part of this paper I want to touch on three trends in the ecology of the educational system as a whole. In the third and final section I will return to the role of the random as it touches on both the educational system as well as particular instances of learning by individuals.

II

Three issues will dominate the coming decade's debates over education. First is the question of what to do about the down side of the baby boom. How can our educational institutions respond to a declining demand for services? The numbers tell the story: 4.3 million births in 1961, capping a trend that began after World War II, down to around 3.1 million births per year in the early seventies. Though these demographic figures are hardly news, they color and condition everything else that one might say about the future of education. We must get used to operating in an era of declining quantities. Numerical growth is a thing of the past, the distant future, and may remain an isolated exception. To put the best face on this basic fact of educational life, let us now speak of a move from quantity to quality.

The second issue relates to the question of uniformity or diversity in our educational system. There are good reasons to suggest that we will see a great deal more diversification in the kinds of education offered. [1]. This trend carries with it both dangers and opportunities. Customized quality education for some may come at the cost of educational resources for others. Parochial schools, voucher systems, training by private industry, and increased use of information technologies all have advantages and disadvantages. But almost as certain as the declining numbers, the question of diversification is not "whether," but "how."

The third issue concerns the last mentioned item on the sources of diversification: information technology as a topic in its own right. Just as industry replaced agriculture as this country's major employer, so now American society is moving out of a manufacturing economy and into an information economy. As raw materials become more and more expensive, and as microprocessing technology makes computation and data gathering less and less expensive, the value added factor that allows a business to make a profit will depend more on information and less on the shaping and fashioning of raw materials. The dawning of the information society means far more than a shift from manufacturing shovels to manufacturing calculators and computers. It is not just a question of what kind of training people need in order to get a job manufacturing electronic instruments. The more significant question is this: "What kind of education do you need in order to live and work in a society where everybody is using the products of the information economy?"

Any one of these three topics—from quantity to quality, from uniformity to diversity, and from manufacture to information—deserves treatment on its own. But each of these topics, when projected as a separate problem, turns out to be insoluble. There is no quick way to increase the numbers of students. There is little likelihood that the trend toward decentralization and diversification will cease. Finally, there is no turning back the clock on information technologies. So whatever fears we may have about data replacing wisdom and technical training supplanting the liberal arts, even the champions of the liberal arts curriculum must face the fact that wisdom must find its niche within the information society, for that is where we shall be living.

Though each of these three topics may appear insuperable when treated as an isolated problem, all three together may offer some hope for a coherent agenda for the co-evolution of education and society over the coming decades. Rather than compounding themselves into a more insoluble dilemma, the problems we face in education may yield to a kind of phase shift to a context in which each problem turns into the solution to other problems.

To illustrate the point, consider the relationship between diversity and the information society. When both the country and its educational system were growing, public education in a democratic society was mandated to extend an equal education to all its citizens. To have an informed electorate and a unified citizenry, the country needed a way to socialize as many people as possible into a uniform American experience. Those were the days of the "melting pot" mythology. Immigrants and native-born, rural and urban students all worked their ways through similar textbooks and studied for similar exams.

Now the mandate for public education has changed. For one thing the evolution of television and the media remove the burden of extending cultural homogeneity from the educational system. The most unifying force in the culture today is doubtless the hegemony of network TV. From coast to coast children get the same message about "the American experience," not from a textbook with that likely name, but from "Happy Days," "Little House on the Prairie," and "Hill Street Blues."

Second, even if the media had not taken over the task of unifying American culture, other trends indicate that the mythology of the melting pot is obsolete in any case. In many different ways Americans are choosing to identify with smaller groups rather than with the

nation as a whole. Whether one considers ethnic identity, gender identity, age groupings, regional affiliations, or any of a number of special interests, the lesson seems to be clear: most people prefer loyalties that are closer to home than to the nation as a whole. This trend toward decentralization is evident in distrust of big government, and it is being felt also as an increasing distrust of "big education." National guidelines, standardized tests, and other instruments of uniformity will meet increasing resistance from local initiatives.

The trend toward decentralization and diversification, combined with the evolution of the media, cast a new light on the original mandate of public education and on the shift from quantity to quality. We are no longer in a stage of growth where extending the same educational package to ever greater numbers call for ever greater resources. Instead we find ourselves in a situation where uniform socialization has been taken care of (perhaps all too well) by the media, and the limited resources that remain available will more likely be spent on "inreach" rather than outreach. That is to say, instead of extending a uniform package outward toward a population that was previously unexposed to public education, now we find ourselves reaching down within communities to tap local resources already in place. By local resources I do not mean only money, but traditions, talents, crafts, lore—that repository of human achievements that make each place unique.

III

I do not claim to have in hand an educational policy that will answer all the needs of the eighties and nineties. On the contrary, my concern is more with guarding against any uniform policies that would claim to offer such an all-encompassing answer. My strategy is to introduce, through the example of new developments in evolutionary theory, a paradigm that suggests an appropriate stance toward developments that none of us can hope to control.

As a title for these final remarks, let me suggest the phrase, *from training for perfection to learning from error*. The basic point is just this: both the Greco-Christian and the Newtonian paradigms tend toward the imposition of their respective ideals of rationality at the expense of the kind of randomness and diversity that creative learning requires, both at the systemic and at the individual levels. Any single ideal of perfection leads to a suppression of diversity in hopes of

eliminating "errors." But an error in one context may be an asset in another. As the increasing pace of history generates new contexts ever more quickly, resilience and diversity will be more and more valuable.

At both the individual and the systematic levels, instances for the application of this insight abound. For the individual it is almost a truism that learning how to learn is more valuable than learning any particular piece of rote knowledge. Bateson's term for this learning how to learn is *deutero-learning*, by which he would suggest a second level or higher type of learning. Education that features the training of basic skills may achieve first level learning at the expense of deutero-learning. Training in the basic skills, even if successful, may be distasteful enough to turn off students from further learning. This insight, hardly new, prompted educators during the 1960's to make learning more lively—at the expense of basic skills. Experimental schools stressed process over content—often to the extent that students did not learn enough to learn how to learn.

Reciting the familiar vicissitudes of fashion in philosophies of education might seem to be an exercise in despair. Will we never learn the golden mean between process and content, between deutero-learning and basic skills? Must we suffer such unstable oscillations and fluctuations of educational policy forever? But a broader and more systematic perspective would suggest that the Aristotelian paradigm, with its talk of a golden mean, might represent an inappropriate standard for the evolution of education. Nor is the Newtonian/Darwinian perspective much better. We do not want to maximize mechanical performance along some single scale of efficiency or expertise. Instead we want to optimize a range of different learning styles.

Just as the cycles of the budworm contribute to diversity over time, so the cycles of fashion in educational philosophy may contribute to the resilience of the social system as a whole.

This expansion of perspective (to include diversity over time as well as diversity at a single time) should not be taken as an abdication from any and all value judgments. Carelessness and stupidity detract from both process-oriented and content-oriented education. Mistakes are always possible, within any responsible educational approach. The important thing is that we learn to learn from mistakes, that we not suppress information about mistakes in order to maintain the illusion of progress toward any single ideal of perfection.

The cost of suppressing information about mistakes is confusion about one's interaction with one's environment. Success and failure become indistinguishable. Individuals in a system that grants only A's, and larger systems like armies that report only good news to those in command, both lack information about the differences between successful and unsuccessful interactions with their respective environments. In order to learn, people need to know the difference between success and failure. But in order to learn how to learn, societies need to be able to fail and learn from mistakes. Content-oriented training for perfection in the basic skills tends to penalize those who learn how to learn through risk-taking. Process-oriented education often runs the risk of failing to identify mistakes *as* mistakes. Anything goes. Both approaches have their blind spots and vulnerabilities, so the best we can hope for is a cycle of fashions in which we learn, again and again, from the mistakes of both approaches.

Right now we would seem to be deeply immersed in the "back to basics" movement in American schools. Are we ripe for a return to experimental schools? But we already have experimental schools: the experiment is the return to "basics." But basics education will not last, for the following two reasons. First, the tide will turn in favor of the general, systematic, evolutionary dynamics just reviewed; and second, the new information technologies favor a turn toward deutero-learning for human beings. Just because computers are so good at the non-random tasks of processing, storing and retrieving atomic bits of information, human beings who try to compete on that level are doomed. Computers will render pedantry redundant. The informational niche where humans have an advantage over computers is precisely in the realm of the random and the creative.

As objective knowledge—information, data—becomes more readily available, a more subjective knowledge base will be at a relatively higher premium. Inreach toward the unique and particular will increase in relative valuation as the universally reproducible decreases in value. As information in general increases in value, those who can transfer skills in handling information—teachers—will be in demand. Those who can teach what computers cannot do will be in particular demand, for their skill will not be in danger of being rendered redundant by computers.

If I may hazard a guess at how these evolutionary reflections will come to bear on actual practice in the classroom, I would look for a

greater emphasis on experiential learning. I do not mean course credit for "life experiences" outside the classroom, but an experiential pedagogy that is already being practiced by some pioneers within the classroom. Role-playing and simulations lead to a subjective learning about the internal dynamics of groups and individuals. How can a group work together to solve problems? What resources do they have? What are their weaknesses and how can they overcome them?

Two different trends point to a thirst for this kind of learning, a thirst that has manifested itself in non-academic situations where its significance has not been appreciated by educators. Trends in religious practices over the past several decades show a move away from the pedagogy of the lecture (or sermon) toward an emphasis on more direct participation in some sort of religious experence, whether it be Pentacostal frenzy or the practice of meditation. Second, training methods in the "consciouness movement" like est, LIFESPRING and Scientology have separated experiential learning from the specific orthodoxies of religious tradition (let me be quick to add that I am not claiming that either evangelical religion or the merchants of consciousness expansion have the answers to education's future). My point is simply that the popularity of these contemporary movements indicates certain needs that future educators must find their own ways to fulfill. The upsurge of evangelical religion, together with the technologies of consciousness *and* the information revolution are forming a new pattern, a new environment, a new ecology that will call for certain adjustments in the schooling of the species.

The emergent paradigm of systematic adjustments to random fluctuations, especially as it is evident in evolutionary theory, suggests a path that is different from both the competitive individualism of the Newtonian/Darwinian paradigm and the faith in a natural or divine plan in Greco-Christian teleology. Species come into being and pass away, and we are not necessarily the beneficiaries of the next step in evolution. But if we learn to work together, to co-evolve with other species, if we learn the experience of cooperation as well as intellectual competition, if we learn, as Bateson often put it, that the relevant unit of survival is not the individual but always species-plus-environment, then there is a good chance that we can thrive in the information-rich environment of the future.

Notes

[1] For a sense of the depth of the trend toward diversification in American society, see Nathan Glazer and Daniel Moynihan, *Beyond the Melting Pot*, Cambridge, Mass., 1963; Andrew Greeley, *Why Can't They Be Like Us?*, New York, 1971; Richard Scammon and Ben Wattenberg, *The Real Majority*, New York, 1970; Michael Novak, *The Rise of the Unmeltable Ethnics*, New York, 1973.

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Education: Bridging Past, Present, and Future

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Historically the function of education has been to bridge the past and the present. Traditional societies maintained themselves by transmitting cultural norms through recounting their myths and reciting the virtues of their ancestors. The young learned appropriate behaviors and skills through an apprenticeship type of learning. The person credited with initiating modern curriculum development, Franklin Bobbitt (1918), designed a curriculum early in this century by studying the competencies held by successful adults in the society. The present-day competency movement has its roots in the work of Bobbitt.

Bobbitt, together with members of traditional societies, recognized that there would be a future. But they assumed that the future would be virtually unchanged from the recent past and the present. And generally they were correct in this assumption. They were living in what Mead (1970) called a postfigurative culture, "One in which change is so slow and imperceptible that grandparents, holding new born grandchildren in their arms, cannot conceive of any other future for the children than their own past" (p. 1). Bridging the past and the present was a satisfactory role for education in such a postfigurative culture. Note, however, that grandparents today cannot conceive that their grandchildren's future will be like their own past.

Mead (1970) identified the culture of 1970 as cofigurative, ". . . one in which the prevailing model for members of the society is the behavior of their contemporaries" (p. 32). This was an apt description of the 1970s; a decade in which the locus for socialization in our society shifted away from adults and toward peers, a shift that was accelerated as single-parent families and families where both parents were employed outside the home increased and thus reduced meaningful adult contacts for children and youth. Interacting with peers, listening to the radio, and watching television and movies

filled the empty hours and became important socializing influences.

Mead (1970) looked ahead to a prefigurative culture—one in which adults learn also from their children.

> In this new culture it will be the child—and not the parent and grandparent that represents what is to come. Instead of the erect, white-haired elder who, in postfigurative cultures, stood for the past and the future in all their grandeur and continuity, the unborn child, already conceived but still in the womb, must become the symbol of what life will be like. . . . This is a child who is a genius or suffers from some deep impairment, who will need imaginative, innovative, and dedicated adult care far beyond any we give today" (p. 88).

Mead referred to those who grew up before World War II as pioneers " . . . immigrants in time who have left behind our familiar worlds to live in an age under conditions that are different from any we have known" (p. 74). Until recently the elders could say, "I have been young and you have never been old." Today the young can reply, "You have never been young in the world I am young in."

Whereas an education bridging the past and the present was acceptable—even desirable—in a postfigurative culture, it is not adequate for a prefigurative culture marked by rapid changes. To educate children for the status quo is to educate them for obsolescence. Education for a prefigurative culture needs to build bridges between the present and the future. At the same time effective education will also bridge the present and the past.

Studying the past provides a sense of who we are. Witness, for example, how Haley's book, *Roots,* triggered countless efforts to trace genealogies. Or, for another example, note the present nostalgia for old songs, old cars, antiques, etc.

The study of great art, music, and literature from the past helps to illuminate our own condition and answer the question "Who am I?" Art, music and literature transcend time, place, racial and ethnic barriers, and provide a source of values that may be important to humanity's survival.

Those interested in forecasting the future recognize the value of studying the past. One effective method of forecasting is to extrapolate past trends into the future.

Thus, for example, studying a graph of the cost of living index provides a clear indication that more inflation is ahead.

A knowledge of the past can also help forecast the reoccurrence of events following a cyclical pattern. For example, there are remark-

able parallels between the demands for a Return to the Three R's in the late 1940s and early 1950s and the present Back-to-Basics movement. The middle and late 1950s were marked by a demand for excellence in education. Toward the end of that era, Gardner (1961) published the book *Excellence* in which he posed the question: Can we have both equality and quality in education? His answer was that we must have both needs. The cyclical nature of the swings from an emphasis on equality to one on excellence suggests that the 1980s will be marked by a new push for "quality" in education, a thrust that is already building.

As we turn from education: bridging past and present, to education: bridging the past, present and future—we ask, "What do we know about the future that will help us design an education to bridge from the present to the future?" The most striking characteristic of the future is the speed with which change is likely to take place. Platt (1981) in his article, "The Acceleration of Evolution" summarized major evolutionary jumps in such areas as biological evolution, energy conversion, methods of travel, tools and weapons, detection and signaling, problem-solving and storage, and mechanisms of change. He lists these changes over the past 40 years:

molecular biology
recombinant DNA
nuclear fission and nuclear fusion
nuclear weapons
solar electric power
space capsules
rockets
automation
radar
laser
television
electronic data processing.

It is difficult to comprehend the speed of change when we are a part of it, and of course, given the speed of change, it becomes increasingly difficult to forecast the future.

In 1966 a film entitled "Futures" featured interviews with some of the world's leading futurists—individuals such as Buckminster Fuller and Herman Kahn. Each made forecasts regarding the future; but, no one forecasted the discovery of DNA and genetic engineering. It is estimated that the amount of knowledge in this field is doubling every

two years. New breakthroughs have dramatically speeded up the decoding of genetic material. Soon there will probably be a record of all the genetic information needed to create a complete human being.

Computers provide another illustration of the rapid pace of change. Evans (1979) dramatized the speed of development when he said that if the automotive industry had developed at the same rate as computers and over the same time span, "today you would be able to buy a Rolls-Royce for $2.75, it would do three million miles to the gallon, and it would deliver enough power to drive the Queen Elizabeth II" (p. 76). He added that "if you were interested in miniaturization, you could place half a dozen of them on a pinhead" (p. 76). Even as we are trying to comprehend the magnitude of that shift, IBM announces that by 1984 it will have a new line of computers with wires thinner than a human nerve fiber and semiconductors cooled to minus 269 degrees celsius. These new computers will be able to run 70 million instructions through a memory cube the size of desk telephone—50 times faster than today's most powerful system. Given the rapid development of computers, Evans concluded that " . . . human society is going to make a radical change in the way it handles and stores information—it could turn out to be one of the most momentous developments that Man has known" (p. 103).

Platt (1981), after analyzing all of the changes, concluded that life on earth is nearing "the greatest turning point in four billion years." He added that "never before have so many momentous developments occurred as close together. The changes bombarding this generation are resulting in the most unique age in the history of mankind" (p. 14). It is not the purpose of this article to document past changes or future forecasts; rather to explore an appropriate education for a future of very rapid and often unforeseeable changes.

Education that bridges the present into this accelerating evolutionary future will enable learners to deal with the complex problems they will face. Mead (1970) quoted from an essay by a fifteen-year-old boy:

> There is mass confusion in the minds of my generation in trying to find a solution for ourselves and the world around us. We see the world as a huge rumble as it swiftly goes by with wars, poverty, prejudice, and the lack of understanding among people and nations.
>
> Then we stop and think: there must be a better way and we have to find it (p. 76, 77).

We cannot give the author the answers leading to a "better way" for we do not have them. But educators should give him and his cohorts an education that will enable them to find the answers to complex questions still unformulated. Education for them must bridge the past, present, and future. To achieve this bridging requires new conceptualizations of education—new paradigms of education.

Ferguson (1980) described a paradigm as " . . . a framework of thought. . . . a scheme for understanding and explaining certain aspects of reality" (p. 26). To illustrate a paradigm, recall that Ptolemy held that the earth was the center of the universe. However, the astronomer Copernicus found that many astronomical observations did not fit this paradigm. Accordingly, he developed a new paradigm that placed the sun at the center of the universe with the planets revolving around it. This paradigm shift had profound effects. What are some of the new patterns of thinking about education, paradigm shifts, that are necessary if education is to bridge the past, present and future—if education is to be appropriate for a prefigurative culture?

A common framework of thought is to view education and schooling as though they were the same. Although we may intellectually recognize that schooling is but one of many educational institutions within society, operationally we treat education and schooling as though they were synonymous. For example, if you ask a person in the street about education in the community, you probably will hear only about the schools. Or consider "Boards of Education"; are they concerned with the public library? art museums? science museums? public television and radio? They should be called "Boards of Public Schools." One consequence of society's treating education and schooling as synonymous has been for society to automatically assign educational problems to schools. This has overloaded the school curriculum while failing to build up educational forces elsewhere within our society. For example, was any consideration given to having insurance agencies and automobile dealers teach driver education?

Another needed shift in our thinking relates to the role of education. The general view is that education should prepare children and youth to live useful and full lives in our society. The contribution of education to the development of the individual and to the development of society is emphasized. This general view was formulated in a postfigurative culture and is an admirable conception for an educa-

tion that bridges past and present. But is it adequate for education in a prefigurative culture—for an education that bridges past, present, and future? Not if educators and society assume a relatively static society as prevailed in a postfigurative culture.

In a generally uncertain future, rapid social, economic, and technological changes will pose unimagined problems to be solved. Correct solutions will require the application of knowledge from many disciplines and will be based, in the last analysis, on value judgments by decision makers. Survival will depend upon the ability to solve these problems and, given the rapid pace of change, to find the correct solution the first time (recall that the spacecraft Columbia could not circle the landing area and try for a second time).

Given the complexity of the problems and the pace of change, survival depends upon the ability of people to go on learning throughout their lifetimes. In a postfigurative culture it could be assumed that once a person had certain knowledge and skills they could function effectively throughout their lifetime. In a prefigurative culture, the only safe assumption is that individuals will have to continue learning throughout their lifetime. Eric Hoffer, the philosopher-teamster, summed it up in an interview with Bill Moyers. "What we need is a learning society—not just a learned society." A learning society has a dynamic quality, while a learned society appears more static.

A second paradigm shift for education, then, has to do with the role of education. The present paradigm is that the role of education is to produce a literate, learned society. The new paradigm is that that role of education is to facilitate and maintain a learning society. Note that a learning society would be literate and learned, but (and this is important) a new and dynamic dimension has been added.

Hoffer not only suggested the idea of a learning society, his life provided a prototype of an individual in a learning society. Hoffer never had an opportunity for a formal education—what he knew he gained through his own initiative. He became one of the seminal thinkers of our day. (We will never know what might have happened to Hoffer had he gone through our schools.)

The shift in viewing education's role from developing a learned society to facilitating and maintaining a learning society is more than just a semantic play on words. Whereas this new paradigm may not be Copernican in its effect, it would have a major impact on how we teach and on how we organize education.

One major shift would be in the relationship of the teacher and the

learner. The old paradigm made the teacher responsible for the student's learning with the student obliged to learn. The new paradigm of a learning society *shifts the responsibility for learning to the learner*, with the teacher obligated to teach. Faure (1972) recognized that such a shift will not be easy:

> The man submitting to education must become the man educating himself; education of others must become the education of oneself. This fundamental change in the individual's relationship to himself is the most difficult problem facing education for the future decades of scientific and technological revolution (p. 161).

Teachers respond enthusiastically to the idea of shifting the responsibility for learning to the learners, but fail to act in ways which would achieve this shift. For example, when a college professor distributes a syllabus to a graduate seminar which specifies the goals to be achieved, provides the bibliography to be read, assigns papers to be written and describes how the work will be evaluated, is he or she helping students become responsible for their own learning? Are the students given an opportunity to be self-directed in their learning?

Our metaphors of teaching reveal relationships between teachers and learners. One familiar metaphor is kindergarten (children's garden) where children likened to plants are to be helped to grow by the teacher. Another metaphor of the teacher is a sculptor molding the clay. Still another, and rather crude, metaphor portrays a teacher pouring knowledge into the student's head through a funnel. Note the dominant role of the teacher in each of these metaphors—the teacher is responsible. We need new metaphors for teachers and learners in a learning society. For example, consider the poem by Guillaume Apollinaire quoted by Ferguson (1980):

> Come to the edge, he said.
> They said: We are afraid.
> Come to the edge, he said.
> They came.
> He pushed them . . . and they flew. (p. 293)

Parent birds do not invite their fledglings to the edge—or push them off—until they are ready to fly. Nurturing has taken place before the moment of first flight. Ferguson (1980) suggested that our schools may not be providing the needed nurturing. "Young minds are dampened and diminished every day in numbers too great to bear

thinking about, forced through a system that stunts the capacity for a lifetime of growth." She added that in contrast to insects, "human beings start out as butterflies and end up in cocoons" (p. 296).

Learners, if they are to take responsibility for their own learning, in a learning society must be self-directed. Skills of reading, writing, and computation are prerequisites for being a self-directed learner in our society—soon it will be necessary to add the ability to interact with a computer. Although these basic skills are necessary to be self-directed as a learner, they are not sufficient conditions. Witness the many individuals who, after they acquired these skills, stopped learning.

Attitudes are also important in developing self-directed learners. Brookover and associates found that the "climate" within elementary school classrooms accounted for some of the variance in achievement. A climate variable that had the largest correlation with achievement was "Student Sense of Academic Futility." A high degree of academic futility was noted in schools where students felt they had no control over their success or failure in the school social systems; "the teachers do not care if they (students) succeed or not and their fellow students punish them if they do succeed" (p. 314). It is easy to see why a high sense of academic futility has a negative effect on academic achievement; it is crucial to recognize that the attitudes in such an environment will interfere with students becoming self-directed learners.

Classroom environments that enhance students' self-esteem through learning will have the opposite effect. When people succeed in learning something important to them—whether it is how to cook an angel food cake, ride a bicycle, or write a computer program—they feel better about themselves. These people are on the way to becoming self-directed learners, if they have not already arrived. They are developing a love of learning as they enjoy the satisfaction that comes from realizing their goals.

Unfortunately, many current practices in education do not encourage the development of self-direction. The competency-technology curriculum design in which the teacher sets the objectives, specifies the learning experiences, and evaluates the accomplishments does not encourage self-direction by the learner. A needs assessment which enables the teacher to work with students on their weakest areas seems guaranteed to having students spend their time working in areas where they have the least chance of success. Why not

conduct a "strength assessment" and encourage students to spend time developing their talents?

An education that bridges past, present, and future not only needs to develop self-directed learners, it also needs to help these individuals become capable of solving complex problems. There is a growing awareness of the need to teach critical thinking skills in schools and colleges. No longer do educators take it for granted that students will learn critical thinking merely by going to school. In schools as well as in colleges and universities specific courses are being developed to promote problem-solving and to help students sharpen their reasoning abilities. A commission on the humanities, sponsored by the Rockefeller Foundation, recommended that critical thinking be placed among the basic skills.

It is not easy to teach the critical thinking skills that will be needed to solve the problems of the twenty-first century. It is even more difficult to "teach" the values that will be needed. If indeed values can be taught, whose values should prevail? In spite of the difficulties involved, it would be unfortunate to avoid the value issue. People engaged in critical thinking need to recognize how often their values are coming into play; for example, in the assumptions they are making. They need to realize that the consequences of their decisions often affect lives. At the very least, we can help individuals understand how they are using values and encourage them to examine every decision from a values perspective.

We have proposed that a learning society would be composed of self-directed learners with the capacity to solve critical interdisciplinary problems utilizing value judgements. How would education be organized in order to facilitate and maintain a learning society?

Education in a learning society will provide a variety of resources to enable self-directed learners to continue learning. Since education is broader than schooling, self-directed learners should be able to go to many sources for information. Drawing once more on our metaphor on teaching, birds in the nest must have food brought to them, birds that can fly go many places to forage their food.

Education should provide many opportunities where self-directed individuals can learn: schools, colleges, universities, libraries, computer centers, museums, workshops, churches, synagogues, recreation facilities, etc. Learners may need assistance, either through a counselor or a directory in finding appropriate resources. Self-directed learners may need access to "teachers" as well as informa-

tion sources. These may be teachers in schools, other members in the family unit, another community member who has the desired skill or knowledge. Parents may learn from their children in this prefigurative culture.

Some loose linkages between the various components of the learning environment would be desirable for three reasons. First, greater use can be made of scarce resources if needless overlapping is avoided. Second, a self-directed inventory of resources could reveal areas where particular learning opportunities were missing or in short supply. Third, the effectiveness of all the components in the educational system is enhanced when there is a degree of congruence in their goals. Thus, for example, both the home and the school are more effective when they are in general agreement on purposes.

Precautions need to be exercised in developing the type of educational system (not school system) envisioned in this article. Saylor, Alexander, and Lewis (1981) listed four assumptions that should guide in developing education for a learning society:

1. Be certain "that educational needs associated with both socialization and personal development are met" (p. 394). The goal of facilitating and maintaining a learning society augments these goals, it does not replace them.

2. "Assure access to equal educational opportunity for all citizens" (p. 395).

3. Provide plans for lifelong learning to meet the needs for retraining to enable citizens to "play a part in directing their own destiny and to cope with societal changes beyond their control" (p. 395) and to assure opportunities for personal growth.

4. Capitalize on every resource for learning.

Meeting these conditions will be difficult, but failure to meet particularly the first two conditions could be a fatal flaw in any plan.

A future worth having is worth working for. There are immediate steps that can be taken that will lead to an education that will bridge the past, present, and future. First, everyone who has the opportunity to teach others can examine his or her practices and ask: How much am I encouraging students to be self-directing? What else can I do to help them become self-directing? Second, make a canvass of the various learning resources within your community. This canvass will be more effective and less work if you can get others to help you. Third, make use of these resources and encourage others to do so. Fourth, if possible encourage representatives of these resources to

begin to plan together. Finally, as a teacher provide an appropriate role model for students. Let your actions show that you are self-directed in your learning and that adaptations in your teaching (as well as in your personal life) will enable your to lead into the future.

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Thinking and Education: A Futures Approach

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It is not hard to reach the general conclusion that, in the United States, most schools do not educate students for today's and tomorrow's world. The implications of a changing society and world are all around us, yet educational institutions have barely begun to address new issues, problems and challenges. Many students are still memorizing large amounts of information in a society where knowledge has exponentially exploded. Trends in computer retrieval and home computers make it possible to pull together information for specific purposes, yet students continue to learn bits and pieces of trivial information, often useless to them and the society in which they will live. Schools are not preparing students to live in a complex society with job opportunities primarily related to service and information-oriented careers. Complex issues require new, important skills, such as general thinking and problem-solving skills, yet little time is spent in helping students practice using these vital skills. It is no wonder that many students and parents feel lost, bewildered and demoralized.

Our changing world suggests new challenges for education, in order to help prepare students to live in today's and tomorrow's world. Factual knowledge can no longer be taught in and of itself, but must be used as a vehicle for focusing on fundamental, significant ideas and choices. Freedom, justice, diversity, interdependence, complex career choices, democracy, change technology, alternative futures, current issues, cultures, the human condition, physical "laws," and so on, can be developed through many subjects, topics, readings and experiences.

Knowledge and ideas, however, are not enough. Today's lifelong learners need skills and attitudes that will enable them to continue learning throughout their lives. The ability to communicate in many different ways—through reading, writing, speaking, effective use of

language—is even more critical in a service/information-oriented society. Personal reflection and interpersonal skills are valuable in a society where psychological survival is difficult and personal relationships often confusing.

An educational focus on significant ideas, self-directed learning skills, communication skills and personal reflection–interpersonal skills is important. But perhaps the most important, critical set of skills on which schools and educational institutions must focus are thinking skills. Thinking comprises a particularly important need in a society with rapid change, many alternative futures, and numerous individual and collective choices and decisions. Thinking enables students to continually confront issues and problems with skills that will aid them in developing new ideas, making sound choices, making better decisions, and understanding the world around them. Thinking aids forever—"Give me a fish and I eat for a day, teach me to fish and I eat for a lifetime."

Development of Thinking Skills

The major purpose of this article is to focus on the need for "thinking" education as part of a futures education. The primary emphasis is on types and modes of thinking suggested by futurists and others that should become a major component of all schooling. There is a need to clarify the "required" basics of thinking, the components of thinking that should be regularly practiced in schools and educational institutions, and the types of thinking for which schools should be held accountable. Several basic elements of thinking will be explored, using an assessment form that should help educational personnel evaluate their own thinking programs (see Appendix and parts 1 through 6 of this section). The basic elements of thinking suggested here are thought to be necessary processes for more effective living in today's and tomorrow's world.

1. *Scientific Thinking*

Scientific thinking has moved us into a modern, post-industrial age. For thousands of years, men and women often suffered cruelly at the hands of nature. Myths and beliefs about man and nature made it difficult to use nature to people's maximum advantage. Myths and beliefs, under the guise of justice and righteousness, often led to extreme cruelty among men and women. Many men and women, however, dared to question and to search for "truth." They looked

for evidence to support disputed claims. The earth did not revolve around the sun. Magic dances did not make it rain. Witches were not the cause of bad crops. Human sacrifice did not appease the gods and make life bountiful. These discoveries, and thousands like them, occurred as men and women began to use scientific patterns of thinking. Tolerance for differences in beliefs was encouraged when none could prove the infallibility of their claims.

While schools have paid lip-service to the teaching of scientific inquiry and its thought patterns, there is little evidence that students today receive much opportunity to practice these skills (see, e.g. Weiss, 1978). These skills include the following:

a. *Increased questioning (fostering curiosity)*

Environments that support question-asking increase the possibility of scientific inquiry. Few classrooms enable students to continually question. Questioning, when practiced, can lead to new ways of thinking about issues and problems, and provide new perspectives and new challenges. Even a reading activity can encourage question-asking if questions are used to make the reading more purposeful and interesting.

b. *Finding patterns*

Using data and information in the search for patterns helps develop new ideas and concepts. Patterns of events form trends (an important component of future studies thinking). Patterns often lead to new ways of thinking about the past, the present and the future.

Bruner (1965) has suggested an activity that enables students to see patterns in a geography-history lesson. Students are shown topographical maps of an area, such as the eastern part of the United States. They are asked to determine the best location for a city or cities, using this information. In order to conduct this activity, they must begin to see patterns, connections and relationships among diverse data, such as soil, transportation routes, and terrain. This lesson adds a new perspective to the typical geography-history lesson, helping students to practice an important thinking skill.

c. *Forming inferences/hypotheses*

At the heart of scientific inquiry-thinking is the ability to form inferences or hypotheses. These are the testing ground from which new formations are developed. They are not "truths" but tentative

ideas (until they have a substantial body of evidence to support them). They are tentative judgments, subject to testing, support and change. Forming hypotheses and inferences are two of the most critical components of scientific thought. Underlying them are the notions that ideas must be subject to some critical inquiry and experimentation before their acceptance, that many different and diverse ideas may be explored at the same time, and that suspending judgment is of significant value. Tolerance for diversity and uncertainty and the need for accumulation of evidence, along with openness to other points of view, are the hallmark of this approach.

d. *Testing the validity, reliability and "truth" of hypotheses and evidence*

A critical skill for scientific thinking is the ability to analyze validity and reliability of data and hypotheses. Does the evidence suggest what it is supposed to suggest? Is the data itself reliable from which the hypothesis was made? Validity and reliability examination requires a variety of analyses—examining the source of the data, examining data collection procedures, looking for "propaganda" techniques (such as generalities) and questioning whether it is reasonable to assume that the data suggests the hypothesis and supports it. Education must teach its charges the skills to conduct this type of analysis. When students give opinions, "How do you know?" should be a standard type of question for critical analysis. Understanding propaganda techniques should be a required topic of study. Concern for reliable and valid data should be on-going.

Implicit in the scientific-inquiry approach is a set of underlying assumptions, values and perceptions that are critically related to future studies and sucessful future living in today's and tomorrow's world. First, the continual examination and reexamination of beliefs, hypotheses, and inferences suggests an ever-changing system of ideas and relationships. The reexamination is based on the examination of a wide variety of data and experiences, and allows for change and growth. Its antithesis is a rigid world view, ever unchanging and sometimes dangerous to others.

Second, the world is viewed as an open system, with diversity of ideas and behaviors. There is acceptance and tolerance for the "weird" and the "strange," as long as these ideas and behaviors do not harm others. This view is especially important in a world of great diversity and difference.

Third, there is a belief in open communication and dialogue to explore issues and solve problems. It may be that the advent of democracy was in fact coincident with the advent of science—precisely because science requires an open discussion of ideas and evidence. Science requires an open flow of information in order for progress to be made.

Fourth, there is an essential underlying assumption of human dignity for all people and their ideas, and a consensus on the need to search for approximations of "truth" in an ever-changing system. Scientists, if they are true scientists, value people and their ideas, and use the forces of reason, persuasion and experimentation, to change points of view. Each person has something to contribute within this system.

Finally, there is an attitude of "fallibility" (Postman, 1979, p. 212) prevalent among scientific thinkers. This fallibility suggests that an individual can learn as much from failure as from success. It suggests continued efforts at "trial and error" and growth through error, learning from one's mistakes. Continually facing new challenges and learning through error and failure shuld be important values in today's complex, changing world.

2. *Creative Thinking*

Creative thinking requires many of the same thinking processes as does the scientific method, but often with different emphases. If scientific thinking and inquiry emphasizes logical, evidential, truth-oriented processes, creative thinking emphasizes imagination—"a key to the future." Imagination has been an important element in thinking about the future. It has played a significant role in the development of new ideas and inventions, and in alternative visions of the future. Space travel was envisioned in science fiction long before it occurred. Creative thinking also suggests ways to solve problems and work with others.

Many skills can be practiced to facilitate creative thinking. They include:

a. *Challenge*

Creative people also ask many questions, looking for challenges and problems to be solved. The great creative artist may get discouraged at difficulties, but generally views his/her work as challenging. Creative people are curious, searching for solutions to challenging

questions. Question-asking here too, becomes an important skill in creativity.

b. *Flexibility*

Flexibility of thinking includes the ability to make and break patterns of thinking and habit. Mental flexibility includes the ability to make new connections among facts, theories, and events. Flexible thinkers can often take seemingly contradictory or unrelated ideas and relate them in ways that often provide new insights. Flexibility opposes rigidity, inflexibility, and an overreliance on habit. It enables an individual to produce and consider many different ways of looking at problems and questions and find many different alternatives.

c. *Originality*

Originality suggests the ability to think unusually, differently. Originality is a test of imagination and creative flexibility. It fosters unusual connections and the ability to see things in a new key.

d. *Elaboration*

Elaboration includes the ability to finely detail, to weave complex plans, to work and rework ideas. It is the "perspiration" that goes along with "inspiration." While elaboration alone does not foster creativity, it is an important ingredient in the creative process, requiring diligence and perseverance over time.

Osborn (1953), Parnes (1977) and others have developed a process for solving problems creatively. The creative problem-solving process enables individuals to learn to solve problems creatively by going through a series of phases:

Problem sensitivity
Fact-finding
Problem-question finding
Idea-finding
Solution-finding
Acceptance-finding

While it is impossible in this paper to explore these stages in necessary detail, individuals using this process become more able to perceive problems from many different perspectives, gather information for problem solving, generate multiple alternative solutions, develop and use criteria to decide on a "best" solution, and develop

plans for acceptance of solutions. The process provides a vehicle for developing more creative solutions to problems.

3. *Planning and Anticipatory Decision-Making*

In a recent Club of Rome report by Botkin, Elmandjra and Malitza (1979), the authors make a case for another type of thinking they call anticipatory decision-making:

> Anticipation is the capacity to face new, possibly unprecedented situations; it is the acid test for innovative learning processes. Anticipation is the ability to deal with the future, to foresee coming events as well as to evaluate the medium term and long range consequences of current decisions and actions . . . . (p. 25)

Thus, anticipation is the ability to think flexibly and creatively as well as think ahead, imagining the possibilities and probabilities of the future. Anticipation consists of both an attitude and a way of thinking. It requires specific skills and processes related to decision making and planning. Some of these include anticipatory imagination (developing possible problems), imagining and selecting goals, envisioning obstacles, envisioning consequences, flexible thinking, considering others, and exploring one's values.

A useful thinking skill for future decision-making is the ability to choose problems and make decisions based on anticipation. Using the previous criteria, problems are chosen after the following question is asked—"to what extent do the problems and decisions anticipate future problems?" This involves what Ackoff (1974) calls an inter-active approach to planning rather than a reactive or inactive approach. For example, there are several ways to deal with disease. One way is to treat disease after it occurs—a very common American response to medical problems. A second way is to prevent the disease from occurring in the first place. Radiation treatment represents the former, polio innoculations represent the latter. A more subtle and difficult preventive approach is to anticipate future diseases. Environmentalists who attempt to reduce pollution because of its risks to future generations, or those who stop the growth of nuclear power plants because of their long-term risks from nuclear wastes, or the nutritionist who uses nutrition planning as a way to prevent future diseases, or a chemist who is concerned about a herbicide that might cause future germ and viral mutations are all examples of this more subtle preventive approach.

Once a problem is selected, additional steps need to be taken in the decision-making process. These steps help to rationalize the decision-making process, making it useful for futures thinking. The steps include:

a. *Developing alternatives*: Once problems are envisioned, alternative possible courses of action must be considered. Creative, flexible thinking, with an emphasis on brainstorming and other creativity techniques, aid in the development of alternatives.

b. *Exploring consequences*: The ability to examine the short-, medium-, and long-range consequences of alternatives aid in considering them. This step is particularly important since the consequences are essentially forecasts of future events and possibilities.

c. *Developing criteria for selecting solutions*: Values and other criteria play an important role in making decisions. The criteria may be translated into questions that aid in the decision-making process, such as: do the solutions help or hurt others? Do they create new problems? Do they solve originally developed problems? Do they meet individual needs, including my own? Are they humane? Are they cost effective? Practical? Can they be implemented now? In the future? How important is the solution to me? How much "risk" is involved?

d. *Selecting the best solutions*: Once the criteria are selected, solutions can be selected that best meet them.

e. *Implementing solutions*: What strategies are best developed to implement solutions? Who needs to be involved? What needs to be done? Planning for implementation uses many of the same planning strategies outlined earlier, including obstacles, consequences, and flexible thinking.

4. *Mutual Needs Decision-Making: Trade-offs*

In today's complex, interdependent world, decisions must often be made with consideration for many individuals' needs, interests and concerns. In a world with multiple perspectives and interests, often in conflict, it is difficult, especially in free societies (and, I suspect, even in authoritarian societies) to make decisions without consulting those involved. This requires very special thinking skills, ones that we shall call "mutual needs" decision-making skills. The skills are

analogous to those used by a negotiator, who is able to take into account many different needs and alternatives. They include a variety of sub-skills, such as listening, persuasion, creativity, group processing, and decision-making.

5. *Complex Systems Thinking*

Alvin Toffler in *The Third Wave* (1980), writes:

> The third wave causality that is gradually taking shape pictures a complex world of mutually interacting forces, a world filled with astonishment, with change amplifiers as well as reducers, and many other elements as well—not just billiard balls clacking predictably and endlessly against one another on the cosmic pool table. . . . (p. 323).

New knowledge has led to new ways of thinking far more complex than the logical, rational, linear modes of industrial age thinking. Systems thinking suggests a complex, mutually interacting system in which small changes interact with many aspects of the system, creating effects and consequences in many unpredictable and surprising ways. All of this takes place in an extremely complex system in equilibrium, with changes eventually leading to a new equilibrium. The inability to form a new equilibrium eventually leads the system to break down.

This type of thinking is particularly useful to environmentalists and ecologists. In his book *The Closing Circle* (1971), Barry Commoner gives many examples of how "everything is connected to everything else"—and illustrates complex, mutually interdependent forces of nature. The cybernetic nature of the environment—changes from an equilibrium state ultimately lead to new, far different equilibria—is an important part of futurists' thinking.

Thinking in terms of systems, mutually interacting forces, cybernetic systems, equilibrium, and so on, is a fundamental thinking mode for a futurist and perhaps for any citizen today. The ability to understand system-wide ramifications of changes, events, consequences and actions is an important element towards better decision-making. This type of thinking is now employed in many areas, from physical models of the universe and computer models of the future to the dynamics of the human body and structural family therapy.

6. *Ethical-Values Thinking*

The World today, and particularly the United States, has changed

graphically from a generally uni-dimensional set of cultural values and norms to a highly pluralistic society. Although past societies contained some pluralism, it was much easier for each part of the society to be relatively isolated from others and to therefore maintain a high degree of unity. It is much more difficult today.

High-speed communications, television, movies, magazines, even school-based education has provided most people with some education about others. With some few exceptions, most of our youth are exposed to a wide variety of personal and societal values and lifestyles and, within prescribed limits, individuals must make choices as to the values they will subscribe to and live by.

Some families, individuals, and communities welcome this diversity and freedom and embrace it, while others are confused by it. Some feel threatened by it. The problem for many of finding one's value niche in the larger, pluralistic society is there, and is increasingly difficult for many.

As a result of this general cultural dilemma, entire new educational theories and practices have developed. Superka (1976) suggests several categories of values approaches to education. One approach, inculcation, atempts to use our educational institutions to teach and explore what are considered to be enduring, traditional, important values (see, e.g. Rucker, et al., 1969). Another approach, clarification, attempts to teach students skills by which they themselves can develop their own value choices.

This approach emphasizes the development of thinking skills designed to help students solve value dilemmas and make value decisions. One framework teaches value clarification techniques—skills for sorting and developing value priorities, making value choices, and acting on values (e.g. Raths, Harmin and Simon, 1978). Another helps students to develop higher stages of moral reasoning (e.g. Scharf, 1978).

Thinking for Adaptation and Survival

In a world beset by rapid change, population growth, nuclear weapons, value shifts, rapid communications, lifestyle changes, and technological miracles, thinking becomes a key for future adaptation and survival. The quality of lives individually and worldwide may depend on our ability to have mechanisms—tools—in place that

enable us to constructively and successfully solve problems, make decisions, and think clearly. Each individual can and should be educated with the constructive tools of the future—thinking skills.

It is becoming clearer in educational research that a common sense truism holds for learning—the more one practices whatever is to be learned, the more likely it will be learned. Time on task and engagement in learning play an important part in successful learning. If someone is learning to play the piano, practicing ten minutes a day versus one hour each day is likely to make an important difference in progress. Of course, other factors are also important, such as potential for learning, the quality of teaching and materials, feedback and reinforcement, enjoyment and interest—but practice and time on task is critical. Without it, learning is less likely to take place. If thinking is to become an important educational reality for future living, it needs to be practiced. Practice will occur when it is viewed as an important educational goal and when programs and strategies for promoting thinking are known, understood and given high priority.

If thinking skill development is to become a priority, educational leaders must begin to examine what they do in terms of futures thinking skills, problem-solving, creativity and decision-making. At the present time, it is rare in most schools that faculty meetings, in-service programs, educational goal discussions, and curriculum concerns revolve around thinking. In Pennsylvania, for example, one of the twelve quality educational goals focuses on "analytical thinking," but it is only generally defined. To my knowledge, most Pennsylvania school districts do not see this goal as a priority as compared to other goals. As Pennsylvania goes, so goes the nation.

Thinking skills can be and should be taught as a critical component of an education for the future. Each educational institution, school, learning setting can assess their on-going program to determine its weaknesses and strengths with regard to the skills outlined herein. As a summary, an assessment form is developed below that may help schools and other educational institutions assess the quality of their thinking program. The assessment form is developed for the first time, and should be considered initial and tentative. It will probably need revisions and changes to suit different needs. However, it may be helpful in suggesting a way to examine current thinking skill development and improving on it.

APPENDIX

Summary—Assessment Form

Directions: This list includes many, diverse types of thinking for adapting to and inventing the future. For each category, ask the question "Do students practice, and does our educational program provide students with repeated opportunities for practicing, the following skills?" Rate each category on a scale from 1–10, one meaning little or no practice, 10 meaning exceptionally large amounts of practice of high quality. On a separate piece of paper, comment on differences in practice between the skills in each category, and list several ways the skills are being practiced (if at all). Don't worry if you do not understand each skill in each category. Rate each as best you can. Skip any that are difficult for you to understand or you do not wish to rate.

Please note that practice means *students do the practice*, not the teachers. If teachers do the mental work, it doesn't count! After using this assessment form, you may wish to discuss it with staff, to develop a chart of skills practiced at different levels with different activities, and to prioritize what you see as major weaknesses to improve on in the future.

Rating, 1–10

How do students practice the following:

1. Asking questions. Sorting priorities among questions. Using questions as a basis for learning. Finding different ways to ask questions. Practicing asking probing questions for main ideas and meaning.

2. Finding patterns. Looking for relationships, common elements, trends, sequences, concepts, ideas, explanations.

3. Forming inferences and hypotheses. Developing tentative conclusions based on evidence. Making predictions and forecasts based on evidence. Developing explanations from evidence. Developing logical consequences.

4. Interpreting data (e.g. from charts, graphs, maps, photos, pictures, paintings, music and art, etc.).

Rating, 1–10

5. Testing the validity, reliability and "truth" of hypotheses, evidence and information (e.g. critically examining information, its sources, critically examining hypotheses, analyzing propaganda, advertising).

6. Conducting experiments to determine the accuracy and "truth" of hypotheses (including experimental research, interviews, studies, questionnaires, surveys).

7. Learning from mistakes (fallibility attitude).

8. Thinking flexibly, originally, imaginatively.

9. Accepting diverse ideas and behaviors.

10. Elaborating on ideas.

11. Communicating openly and often about events, ideas, opinions, conclusions. . . .

12. Collecting information. Using questions as a basis for collecting information, categorizing information, sorting it into main and subordinate ideas, locating information from a variety of sources.

13. Developing, producing and envisioning many alternatives.

14. Examining consequences—immediate, short-range, medium-range, long-range.

15. Making choices. Selecting criteria for making choices, making the criteria public, weighting advantages and disadvantages, considering other people's needs and perspectives.

16. Anticipatory imagination. Imagining problems that might exist in the future.

17. Anticipating problems, thinking ahead, using the anticipation of problems as criteria for selecting problems to explore, finding clues that suggest future problems.

18. Planning. Imagining and selecting goals. Envisioning obstacles. Envisioning consequences. Considering others. Exploring values.

Rating, 1–10

19. Mutual needs decision-making. Listening to and understanding other people's ideas, feelings, needs, interests and concerns. Using persuasive skills. Working cooperatively with others. Enlarging areas of agreement and reducing areas of disagreement. Creating mutually agreeable alternatives.

20. Systems thinking. Seeeing connections among disparate components. Exploring multiple consequences and explanations. Exploring systems in equilibrium and disequilibrium. Changing one part of a system and determining its effects.

21. Exploring and clarifying values. Making priorities among values. Using values to consider choices, actions, use of time. Acting on one's values.

22. Moral reasoning. Discussing moral dilemmas. Taking positions and discussing reasons for positions on moral issues.

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Initiating Teacher Education for a Future and a Future for Teacher Education

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A Scenario: The Doors Close for Teacher Education Institutions

The big, black, block lettered sign taped on the inside of the shatterproof-glass-paneled door read "Closed Until Further Notice." The possible closing of teacher education institutions had been predicted for the past several years. Events indicating they were in danger had been occurring for the past 10 to 15 years. Thus, in September of 1990, few passersby were surprised to see the sign; some were dismayed, some were disappointed, others were delighted.

How did this closing come about? The following scenario describes the events which effectuated the closing:

1) In spite of the changes occurring in society and in spite of the traditional mission of teacher education to serve as models for public schools, teacher-educators failed to incorporate future focus philosophies and programs to reflect these changes. The result was an irrelevant and obsolete teacher training program which served neither to model nor provide direction for the schools for which they were preparing teachers.

2) The failure of teacher education to provide teachers at preservice and inservice levels with relevant and useable teaching skills resulted in public schools continually having to re-teach their teachers the essentials of effective teaching and other basic classroom techniques. This caused public schools to become increasingly disenchanted with teacher education causing even greater credibility and communication gaps between public schools and teacher education.

3) Because of inadequacies in the preparation of teachers, to eliminate such inadequacies there was considerable discussion in the

early 80's concerning Schools of Education becoming autonomous "Schools of Pedagogy" to establish programs and practices that could be equated with those of attorneys or medical doctors. Committees formed to accomplish this task failed to get beyond the committee or proposal stage. Too much internal resistance from rigid departments and tenured faculty to such "drastic changes" (e.g., extended field experience) resulted in little, if any, significant change.

4) Although teacher training institutions saw a need to tighten entry and exit standards, this proved difficult to do with fewer teacher education majors (due to declining enrollments, lack of financial incentive in teaching and more and more women choosing careers which, in the past, were unavailable to them). In addition, the average aptitude of people entering teaching was declining with the "cream of the crop" of undergraduates choosing careers other than teaching.

Although quality control procedures were adopted for accreditation purposes (and to appease the growing criticism of teacher training institutions), implementing the procedures, however, was considerably less effective. Filling classrooms to accommodate the increased number of tenured professors was still the name of the game.

5) The final and decisive factor which brought about the closing of teacher education institutions was a change in attitude about where "learning" takes place. During the 80's, learning increasingly became viewed as something which could be gained anywhere (e.g., the home via a computer, the factory via employee training programs, etc.). With the rising cost of higher education for the average citizen, many organizations and institutions saw the need of offering additional educational opportunities. Large corporations were among the first to see benefits in providing educational programs at reduced rates for their employees. Not only were they less expensive for the worker, many educational programs could be specifically designed to serve the needs of the corporation. The end result was a better trained employee who was able to extend his/her learning beyond high school in an area of interest at reduced rates and, at the same time, earn money while working for the corporation.

Well, it wasn't too long before K–12 public schools began to experiment with similar programs. Two-year junior college graduates and students with two years of liberal arts education interested in pursuing teaching were invited to serve as teaching interns in K–12 schools. Tuition monies which normally would have been paid to

teacher training institutions were now paid to K–12 school districts. Students served as interns in the schools while simultaneously taking classroom instruction in pedagogy from teachers within the schools and/or staff from the area education agency, board of cooperative services, and/or teacher center. At the end of the two-year internship, during which the interns had shown competence both from a performance level (i.e., demonstrated teaching skills in the classroom) and from a comprehension level (i.e., written examination covering the principles of pedogogical theory and practice), a state teaching license was awarded to all qualifying interns. Early reports indicated that districts hiring interns found them to be as skilled as teachers with two years experience who graduated from four-year teacher training institutions. In addition, the retention, comprehension, and application of pedagogical principles was higher due to the immediate opportunity to relate them directly to the classroom.

These, then, were the circumstances which led to the closing of teacher education in the fall of 1990. But what really destroyed teacher education? In analyzing how these circumstances came about and the inability of teacher education to initiate significant reform to counteract these circumstances, one can conclude that teacher-educators catalyzed their own destruction.

Teacher Education: Growing Obsolescence—Part I

The above scenario is presented to dramatize the possible closing of teacher training institutions and also to draw attention to events happening now which indicate that teacher education (as well as the clients they serve) is showing signs of obsolescence and is in danger of becoming even more obsolete. Whereas some may find the likelihood of teacher education closing its doors as being somewhat remote, the author sees no distinction between this and obsolete teacher education. In other words, if such institutions cannot fulfill the mission for which they were intended, their doors "ipso facto" may as well be closed.

The primary intent of this paper is threefold:

1) to provide supporting evidence justifying the prefaced scenario, indicating growing obsolescence for teacher education;

2) to develop some theoretical constructs which need to be considered in initiating teacher education reform leading to the elimination of obsolescence;

3) to facilitate the development of new directions, new attitudes, renewed optimism and hope for teacher education.

In Search of a Mission

Where does one in education start to search for a mission in order to make the determination between the relevant and irrelevant, essential and nonessential, and purposeful and non-purposeful. Although it is quite evident that the entire wheel need not be reinvented, it is this question of purpose where Ralph Tyler (1981) would seem to initiate movement to assess which spokes should be maintained, replaced, or added. In his remarks made to a 1981 Iowa Education Forum in Des Moines devoted to discussing critical issues in education for the coming decade, he suggested:

> One thing that impressed me was that there was a good deal more statements about problems having to do with means rather than problems having to do with ends. I think a little more attention should be given to the question, what are the purposes of education? (p. 7).

John Goodlad in writing about "What Schools Are For" feels also it is time to zero in on a direction for education, but where to begin seems to be a problem in itself. Goodlad (1979, p. 52) points out, "In studying efforts of the past decade or two to improve schooling . . . it soon becomes apparent that policy makers, educators, parents and others have no basic agreements on where to focus their efforts."

Judith Tanier (Watkins, p. 10), Dean of the College of Education at Michigan State University, realizes a similar concern. "Schools of education are in a depressed state. Everyone realizes that we should change, but expectations for the future are low. We are unclear about our sense of direction today."

Smith (1980, p. 14) goes on to reiterate the need to focus on a direction and purpose for teacher training. "Pedagogy is today in a stalemate. Neither the demands for research nor the practical requirements of the profession have been met by the schools of pedagogy."

Obviously there is a question regarding the mission of teacher education or as Smith would prefer, "schools of pedagogy." His advocacy for patterning schools of pedagogy after the now forgotten normal schools which had their own autonomy and maintained a single purpose may be a big step in not only legitimizing teacher

education as a profession but, of equal importance, in helping to eliminate a conflict over the direction of teacher education.

Smith (1980, p. 14) points out:

> As pedagogical education came under the influence of graduate requirement and the liberal arts orientation, the college of pedagogy was caught between the influence of the graduate mentality and the demands of the public school for efficent and capable personnel. By trying to fulfill two purposes at once, colleges of pedagogy have been unable to realize either.

Unfortunately, not only are the fourteen hundred U.S. colleges and universities engaged in the training of teachers confronted with a stalemate regarding their mission, but also Alvin Toffler, as quoted by *The Chronicle*, believes the structure of higher education may deter them from accomplishing their mission, whatever it may be. States Toffler (Coglin, p. 18), "The universities are locked into a credit game and a diploma game, partly because their own internal structures are now ossified and built on departmental divisions."

The increased number of tenured faculty is one indication of departmental ossification. This, coupled with the overall decline in teacher education majors, presents another problem which is compounded.

The Brain Drain

Weaver (1979, p. 32) reports, "As market demand for new graduates in any given field declines, not only will the quantity of potential students decline but also the quality of the applicant pool prepared to enter that field of study."

This is supported by 1976 results on the SAT verbal and math scores of college bound high school seniors who planned to major in education. It was found that the scores were well below average for all college-bound seniors tested in 1976—34 points below average on verbal, 43 points below on math. What this means of course is that teacher education is now selecting potential teachers from the least academically talented population.

With teaching becoming more challenging, requiring greater skills, the need for above-average teachers has never been greater. Is it no wonder that in order to create new knowledge, to identify new leadership and to continue steps towards positive change, Weaver calls for a solution to the education brain drain?

University Classroom and K–12 Classroom: Worlds Apart

Identifying qualified candidates is one problem, training them with effective skills is another. With regard to this latter point, teacher education shows another sign of growing obsolescence. Robert Benton (Watkins, p. 9), President of Chief State School Officers believes there is a broad gulf between teacher education at the college and university level and what goes on in the classroom. He feels that of what happens in the classroom little gets translated into teacher education. The opinion of Benton and Weaver follows the reasoning behind the recent statement in *Newsweek* magazine which reported, "Too many teachers are bad spellers and worse writers, and their own education is a national disgrace" (Apr. 20, p. 65).

It is reasonable to assume that the increased amounts of in-service given to K–12 teachers in recent years indicates that some important things have been left out of teacher preparation. The author has had the occasion during the past two summers to be invited to district-wide administrative workshops. In both instances, administrators were training their colleagues on the essential ingredients of effective teaching so that the principals could return to their respective buildings and retrain their corps of teachers. As someone from higher education's teacher training sector, needless to say, I felt somewhat uncomfortable due to the fact that "we" were supposed to have already done this.

This seemingly duplicate effort suggests that teacher education programs are hypocrisies. A great deal *is* known about the teaching/learning process. When compared, however, with what "teachers" know after 4 years of "training," the term "injustice" seems inadequate.

Better Occupational Forecasting Needed

Not only is it crucial to provide teachers with skills which are essential for teaching in today's classroom (e.g., proven teaching practices, discipline strategies, dealing with parents, counseling skills), it is also crucial to provide teachers with skills enabling them to respond to the question "What skills do students need to prepare them to live in the future?" Teacher education has been extremely remiss in this area due to shortsightedness in occupational forecasting.

For example, in spite of the growing use of computers in society

now and the almost certain widespread use of them in the future, few graduating teachers have equal skills in teaching students how to use data processors as well as in teaching the 3 R's.

The shortsightedness on the part of teacher trainers is largely due to their absence from K–12 classrooms and an insensitivity to futures thinking (which proliferates irrelevance). This proliferation of irrelevance, from a legal perspective, can be potentially disastrous to teacher trainers. As Leary suggests in his recent book *Education on Trial*, "Combine an incompetent college prof's documented malpractice methods course with a carefully developed lawsuit against a former student (now a first-year teacher), and you have a potentially explosive lawsuit on your hands." He goes on to say that "the time will come when professors and the institutions which employ them will become some of the highest risks in the malpractice insurance field" (1981, p. 84).

It behooves teacher education to be aware of the current and future demands of teaching. Having greater communication with K–12 schools, keeping closer watch on societal trends, and helping to discover needs previously unknown in teaching are essential for preparing teachers with useable, rather than obsolete, skills.

Teacher Education Should Move into the Schools

The trend towards an increased number of educational opportunities provided by agencies other than those identified with formal learning needs to be heeded by universities. Alvin Toffler as quoted in *The Chronicle* believes:

> The university as we know it, the classical university or liberal arts college, is operating in an increasingly strange educational environment, and it hasn't yet come to terms with the fact that it isn't the only purveyor of serious education (Coglin, p. 11).

Virtually every major corporation now provides educational opportunities for its employees. They may not be as extensive as the five-year education program offered by the General Motors Institute, but they are learning experiences and they do occur away from the halls of ivy. Increasingly, universities will see the advantages in establishing Educational Service Centers in the field similar to those established at the University of Northern Iowa. Eventually, such centers could serve as the primary sites for the training of teachers, causing the eventual closing of College of Education facilities on

campus. It is not unthinkable to assume that a future classified advertisement may read "University Education Center for Sale."

Schools Are Flunking

Because K–12 schools are the benefactors of schools of teacher education in terms of personnel, some inheritance of obsolescence is bound to occur. In fact, the public is more apt to criticize education, as was the case in a recent Gallup Poll published in a cover story by *Newsweek* (entitled "Why Public Schools Fail"). The magazine reported that nearly half of the respondents said that schools are doing a "poor" or only "fair" job. Whatever shortcomings exist in K–12 public schools, teacher education has the responsibility to address such issues and respond, if necessary, with reformed programs.

One such issue is the credibility of high school diplomas. Are high school graduates prepared to meet the challenges of today's and tomorrow's world? The authors of *No Limits to Learning* not only believe schools are remiss in preparing youth for life, they believe schools lead to a separation from life.

> As the local neighborhood school expands, becomes more expensive, consolidates, and absorbs more responsibilities cast off by new family demands, it tends to become increasingly institutionalized and rigid. . . . The consequence of such development is that the school's goal of preparation for life is turning to separation from life (p. 65).

With 2,000,000 teachers in today's K–12 schools teaching 43,000,000 students (Dearman, p. 12), the influence (positive or negative) that the schools have on the future of America can be significant.

A greater percentage of both parents entering the work force has resulted in more parenting responsibilities being placed on schools. So one of the most important decisions parents make today is where they choose to live. This will determine which schools their children will attend and which teachers will be playing a significant role in shaping the lives of their children for the next 13 years. Undoubtedly, the realization of the potential influence schools have on the lives of youth has something to do with the public watching K–12 schools with a very critical eye.

Not only do schools have a considerable influence on the shaping of America, via the skills given to students, American schools must also consider the influence they have in the shaping of Third World

educational programs. This is emphasized in *No Limits to Learning* where the authors speak about the shortcomings of education in First World countries.

> They continue to maintain practices and methods that can best be described as obsolete, over-specialized, incomplete, or inappropriate—in short, irrelevant. Long "learning lags" are accepted as inevitable; interdisciplinary studies are rejected in favor of specialization; vital issues and perspectives are neglected or in some cases considered taboo; all these problems are compounded in parts of the Third World where carbon copy educational systems are doubly irrelevant (p. 68).

Curriculum Reform and Glimpses of Tomorrow

There is no doubt the back-to-basics movement has stifled reform at all levels, resulting in a giant step backwards in terms of curriculum development. This feeling is reiterated by the authors of a 700-page compendium of policy papers presented to the Clearinghouse on Teacher Education in which the needs of education in the 80's are described. A U.S. House Subcommittee asked education professionals to submit their ideas on likely trends and possible policies in the 80's. The Subcommittee covered a broad range of concerns such as leadership, social change, and curriculum. It was generally agreed that while there is value in basic literacy and skills, the minimum competency and back-to-basics movements were hindering progress towards focusing on curriculum development concerns.

A related but more critical attack on curriculum is voiced by the authors of *No Limits to Learning*:

> One of the greatest sources of irrelevance in education is not only that obsolete subjects remain but that they obstruct the incorporation of newer, more relevant concerns. There often seems to be no space for the study of key global problems such as the arms race or the emancipation of women. It may be no exaggeration to assert that when the curriculum is already staggering with the weight of the past, there seems to be no room left for the needs of the future (pp. 70–71).

An awareness of and sensitivity to the challenges of the future is where today's schools are in greatest need of curriculum development. Little guidance is given teacher education majors on the criteria for selecting what is essential to teach in terms of helping youth cope with the future. The result is that students leave today's schools having wasted much valuable time and effort in learning the non-

essential. Teachers teaching the non-essential is the greatest travesty perpetuated in teaching today.

If teacher training is to change to counter obsolescence, where must it search for guidelines to shape its mission (and ultimately the K–12 curriculum)? There has been a tendency to look into the past to respond to this question. Yet, when one considers the over-riding purpose for which we have schools—namely to prepare students to lead useful, productive lives, and to possess skills to create and live in the future—then it seems quite obvious that there is a greater need to look ahead.

What, then, will tomorrow be like: *U.S. News & World Report*, in their 1979 issue on "Challenges of the 80's," report significant changes occurring in six key areas: families, cities, population, science, work, and economics.

Cities:

- Rich and poor will rub elbows.
- More neighborhoods will be rehabilitated; old buildings will get new uses.
- Homes will sprout on passed-over land.
- The proportion of Americans living in central cities will fall from 27 percent to 23 percent during the 1980's, but rise from 40 to 43 percent in suburbs.

Families:

- The size of the average family will dwindle due to high cost of raising youngsters and growing importance of careers to women.
- Forty-five per cent of infants born in 1978 will live in one-parent families for part of their childhood.
- Unconventional living styles will increase in popularity.
- By 1990 there will be a 64 percent jump—from 5.3 to 8.7 million—in the number of working mothers with children under 6.

Population:

- The nation will grow older on average with the number of Americans under age 20 falling below 30 percent of the population for the first time in history.
- People over 65, most of them retired, will account for 1 out of every 8 by the end of the decade.
- Twelve per cent of the population will be 75 or older.

Science/Technology:

- Inexpensive home computers will become a reality for many families.
- Doctors will use high intensity lasers for cancer surgery.

- Test tube babies will become a common occurrence during the decade as doctors perfect the technique of embryo transfer.
- U.S. space shuttles will put into orbit a broad range of new satellites for communications, astronomy, and research.

Work:

- More than half of all workers will be ages 25 to 44, increasing competition for promotions.
- Openings in white-collar jobs will grow faster than factory jobs.
- Job sharing, "flextime," part-time will spread resulting in more days off.
- The paperless office will be created.
- Women, as well as blacks, the handicapped, aliens, others, will demand more promotions.

Economy:

- The country is approaching a more prosperous decade, with less unemployment, the prospect of lower inflation, and rising living standards.
- There will be a 21 percent jump in households due to the fact that 42 million Americans will reach age 30, the age when many move from apartments to homes.
- More than 10 million additional women between 25 and 54 years old will join the labor force.
- The median family income will climb from 22,000 a year to 46,000 by 1990.
- The cost of energy will soar, taking a substantial proportion of everybody's spending money (pp. 45–77).

In *The Third Wave*, Toffler argues that, unlike the civilizations of the "first wave" (agriculture) and the "second wave" (industrial revolution), the civilization of the "third wave" will be marked by great diversity in jobs, schools, and ways of life. That diversity will be achieved largely through electronic technology. No greater achievements in electronic technology seem more imminent than those resulting from growth in computers. Edward Cornish, President of the World Future Society, points out that the computer is already responsible for electronic newspapers, computerized shopping, electronic yellow pages, teleshopping, and networking (having access to the information from someone else's program).

Yet even more startling discoveries are reported by O'Neill (1981, p. 54) who claims that "long before 2081, it will be possible to store in a machine the size of a business card all the information of a good sized library. By 2081, any major central computer will have rapid

access to at least 100 trillion words of memory (the number 1 followed by 14 zeros). A computer of that memory capacity will be no larger than a suitcase. Such a machine will be able to read, digest, and present conclusions on 10 to 100,000 books in a second."

Although the changes described above are probable, they are still speculation. There is, however, one thing more certain—the question of values which will emanate from these changes. One change that has already caused considerable analysis of human values (and will cause even more in the future) deals with genetic engineering. Permitting DNA genetic splicing research to be patented indicates we are at the beginning of creating entirely new and different forms of living organisms (O'Neill, 1981, pp. 52–55).

A Crisis Culture

Nena and George O'Neill in *Shifting Gears* (1974) seem to have put their fingers on what "the" problem is in education:

> The real problem is that education has failed completely to teach, or even attempt to teach, students to deal with the world they live in. With the pace of change accelerating, our young people are the first generation to be born into the crisis culture (p. 45).

In at least one way, today's world is different from the world of twenty, thirty, or eighty years ago because of the crisis of crises. What is even more startling is "our reluctance to face up to unpleasant realities plus the fact that the current general crisis will get far worse before it can eventually get better" (Botkin, p. 1).

In agreement is the "Global 2000" report published in July of 1980 by the Council on Environmental Equality. The report's conclusion points to global problems of alarming potential by the year 2000. If present trends continue, the world in 2000 will be more crowded, more polluted, less stable ecologically, and more vulnerable to disruption than the world we live in now. Even if fertility is checked, the "new humanity" (i.e., all the people born in the next 20 years) that will exist on earth by the year 2000 will be equal to the size of the *total* human population ever born by the time of World War I (Botkin, passim). With this sizeable growth in population coupled with minimum amounts of arable land remaining to produce food, one can sense the potential crisis. Whereas "once wars were waged in quest of salt; today energy is, and tomorrow food may become the salt of the contemporary society" (Botkin, p. 3).

There is no need to proceed further citing examples of the global problematique, the crisis of crises. It exists, it affects all, and all of humanity will need to help solve this problem. Hopefully, nationalism will not dominate the minds of people to the extent that they forget their role as a planetary citizen with the responsibility to help solve planetary problems. Teacher education cannot ignore its role in heightening the awareness of prospective teachers to address these global issues in their classroom.

In summary, the world has changed, is undergoing even more change, and will continue to change. Right or wrong, this question of whether or not students are prepared to meet the challenges of change in today's and tomorrow's world is a valid question and certainly one that needs to be continually addressed by educators at all levels and "if as many changes occur during the next seventy-five years as they have in the past seventy-five years or even in the past 10 years, it would seem the greatest challenge facing education is helping youth adapt to and live in this world yet to be discovered (i.e., the future)" (Eggers, p. 11).

A New Spirit of Discovery in Education

These then are the signs which depict teacher education becoming increasingly obsolete. Although reform will need to occur at all levels, reform initiated in teacher education is especially important. Consider the fact there is less experience in teaching today than in 1961. In 1961, for example, 48 percent of all teachers had 9 years of experience or less. In 1976, 56 percent had 9 years or less (Dearman, passim).

If teacher education would begin to initiate reform in the fall of 1982, within 10 years over half of all teachers teaching could have been part of this reform. The impact of these individuals on communities, schools, teachers, and students could be so significant as to result in a new spirit of discovery in education. For this reason, there should be a great deal of optimism and hope in education.

In spite of the crises in education today, it is interesting to note that in studying the history of education, greatest reform resulted at times of greatest adversity. This attitude is reflected by B. Othanel Smith when he suggests that this period represents a golden opportunity for restructuring teacher education. Smith urges education to take advantage of this opportunity when conditions are too favorable to ignore.

He recommends that acting now will generate momentum—momentum that may otherwise be lost for a generation.

A Blueprint for Teacher Education—Part II

With a scenario describing the events which led to the closing of teacher education institutions, given some evidence which lends credence to these events which depict teacher education vulnerable to growing obsolescence, and given glimpses of the world in which today's students will be spending a major portion of their lives, the remaining portion of this article shall attempt to answer the question, "What constructs should serve as the basis for developing philosophies, programs, and practices to help teachers prepare students to live in the future?"

Construct 1: The purpose of teacher education is to help teachers prepare students with the skills and attitudes to create their own future.

In spite of the confusion over the direction of teacher education, the educational mission remains the same—namely to prepare teachers to teach in today's schools. However, it assumes a new meaning because "thinking about the future is only useful and interesting if it affects what we do and how we live today" (Robertson, p. 16). Robertson in the *Sane Alternative* explains that practical thinking about the future involves (1) predicting what is likely to happen, (2) forecasting what would happen if, (3) deciding what we want to happen, (4) planning how to help it to happen, and (5) acting accordingly (chapter 1). Of these five elements, the fifth is the most important. Without action any sensitivity towards the future is lost and teacher education may as well relinquish its responsibilities.

On the other hand, focusing on the future can spark a spirit of new discovery unparalleled in the history of teacher preparation—a spirit of new discovery that is vibrant, vehement, and bold—a spirit of new discovery that necessitates teacher education having some heroes, some new pioneers, some people to model who are willing to take a risk and begin acting on the demands of future. In general, this time should be one of extreme optimism and hope. Glines states in the foreword to his book, *Educational Futures V: Creating and Foresighting:*

> The long range future of learning is perhaps one of the most exciting potential developments of all time. The access of information available

> through electronics, the opening of learning opportunities to remote villages of the world, and the societal change from a central focus on a work ethic toward a learning ethic are among the reasons that learning appears to be headed, in the Twenty-first Century, toward its greatest achievements ever, far beyond the visions of most current educational leaders (pp. i–ii).

The mission of teacher preparation can be involved in this transformation. Not only can it be involved, it can be the Apollo leading us to new vistas.

Construct II: Teacher education will need to adopt those standards and policies which give it credibility as a profession, and offer substantial challenge and intellectual and social rewards to those who choose it as their vocation.

No doubt, low salaries have contributed to the exodus of good teacher-candidates and experienced teachers in the field. But whereas the financial rewards of teaching are meager, other rewards can be great. A few of these are brought out in Smith's commentary:

> The admission procedure should emphasize that the student is entering a profession that profoundly affects the lives of every individual and ultimately the strength and well-being of the nation; that it is an occupation to be taken seriously and calls not only for the utmost ability of the individual but also for complete dedication (p. 39).

The times are ripe for teacher education to shape a course never before charted. Never before have the challenges been greater because never before have teachers had the opportunity to prepare the youth for a new world—a world yet to be discovered.

The teachers who choose to be the Apollos should face critical examination on their aspirations, attitudes, and abilities. Only after having passed such an examination (both academically and performance-based) should they be permitted to pursue the exciting challenge of making a difference in the lives of youth.

Construct III: Teacher preparation should be field-oriented, having ties between K–12 schools and the university.

As Howsam (1976, p. 42) advocates, "To be effective, teacher education must be a collaborative effort which involves the university, the organized teaching profession, and the operating schools and school systems, including their communities."

To facilitate this, he recommends:

> That the establishment of some teacher education centers be located away from the campus, employing well prepared, professional supervisors who retain continuing teaching responsibilities with a local school system and serve as adjunct or parttime members of one or more college faculties (p. 42).

It's ironic that the most important phase of teacher preparation, namely, the field experience phase, is one in which the university has least involvement. Undoubtedly, this stems from the fact that teacher preparation programs are largely campus-oriented rather than field-oriented, which has contributed to the increasing obsolescence of teacher education. This can be changed by prioritizing the communication between schools and universities, by increasing their involvement in the training process, by establishing longer field experiences (and greater quality and rigor in these same programs), and by establishing teacher training centers in the communities where the field experience programs occur.

Construct IV: Teacher educators will need to model those generic teaching and learning principles which have been validated through research and practice.

There are generic teaching skills that are validated by research and do work in the classroom. The teacher of teachers more than anything else must model these skills. If re-training of teachers needs to occur (and in most cases it will), teacher-trainers need to be first in line. Smith believes, "Moreover, the teacher of teachers must use tested procedures, techniques, and materials of training as they are available. And they must themselves possess the skills in which they are training the future teacher. . . ." (p. 56). The lack of standardization and emphasis on generic teaching skills may be responsible for teaching not having evolved into a profession. Too many teachers equate surviving in the classroom with good teaching because they really have no idea as to what good teaching is. To remedy this, according to Smith, "the argument should be clear enough to indicate that the basic purposes of a professional program are, and should be, to see that prospective teachers master clinical pedagogical knowledge, both generic and specific. . . ." (p. 47).

There are too many instances where public schools have had to fend for themselves in providing their teachers with these generic

skills. These should have been the heart of all teaching/training programs. What needs to occur is the integration of these same generic skills into each teacher training program so upon graduation, candidates will be assured of having at least one skill common to all—the skill of knowing how to teach.

Although research about these generic practices are scattered in countless master theses, doctoral dissertations, and volumes of educational research, Madeline Hunter has saved teacher educators innumerable hours by synthesizing the research for application in the classroom. Hunter's work with retention, transfer, motivation, reinforcement, etc. should be a primary source in identifying generic principles of teaching and learning.

Construct V: In addition to generic teaching skills, futuristic teaching skills should also be incorporated into teacher preparation.

How to think systemically, how to be caring, how to be proactive, how to be process- as well as content-oriented, and how to use electronic teaching aids are the more important futuristic teaching skills that should be a part of any teacher preparation program.

Systemic thinking involves viewing the future as a number of alternative futures rather than one future. Humankind must be prepared to experience and cope with any of a number of alternative futures. Proactive thinking involves the use of forecasting, short- and long-range planning, and decision-making skills to determine, among other things, what is really essential to teach. For example, is it really important to teach the history of Brazil in fourth-grade social studies, or should this time be spent in another area? More teachers will need to come to the realization that process is as equally important as content. Interacting in a group to find a solution to a problem is equally as important as the solution itself. "Human caring must become the focus of the curriculum" (Glines, p. 15). Although the sixties and seventies saw a humanistic focus in curriculum, the back-to-basics and minimum-competency emphasis has eroded the emphasis on humanism. The need for a human element in curriculum is greater than ever. This point is emphasized the authors of *No Limits to Learning* when making reference to people engaged in solving world problems. "A preoccupation with the material side of the world problematique has limited their scope and effectiveness. Now a new concern has become evident—to restore the human being to the center of world issues" (p. 41).

Teacher preparation should train teachers in the basics of computer programming and, when the need arises, other technologies which appear destined to become inculcated into society. "Computers are spreading so fast that schools may be forced to teach computer science to children. Reading, writing, 'rithmetic, and IBM could be the new definition of education." This quote from a "Fact Sheet" issued by *Clearinghouse in Education* (p. 1) stresses the need in teacher preparation to include computer skills. If there were ever a probable future, the growth and use of computers by society is the most probable.

By 1985, 75 percent of all jobs may involve computers in some way. Already there are 50,000 computers in use in the schools (*Newsweek*, Mar 9, 1981). But how many teachers really know how to use them effectively (let alone teach students how to use them)? The age of the computer is here, yet we find teachers who are about as ready to deal with computers as a blacksmith was ready to deal with a Ford engine. This will need to change if education is to remove itself from the list of endangered species.

Construct VI: Teacher preparation should foster a global awareness among teachers, which includes the development of interdependence, cooperation, and empathy in students.

In interviewing some 46 international and education leaders to determine educational priorities for the twenty-first century, Harold Shane (1977, p. 54) found, "The need to develop a spirit of 'global community' in an increasingly interdependent world has reaffirmed an important task for education: to recognize and to respect the concept of multiethnic, polycultural, and multilingual education in pluralistic societies both in the U.S. and abroad." The United States is one of the weaker, if not the weakest, among the developed countries in terms of emphasizing international relations. The declining number of students taking foreign languages is indicative of the emphasis schools place on studying other cultures. The fact that human relations training is but a small part of teacher education indicates another travesty in a profession where people are a priority. Teacher preparation does an excellent job of training teachers to foster independence and competition. An equally good job must be done to foster interdependence and cooperation. The ability to model as well as teach human relation skills should be a prime ingredient of any teacher preparation program.

Construct VII: The training of teachers should embody strategies which foster the integration of futuristic process skills in the K–12 curriculum which will help youth cope, thrive, and excel in the future.

What skills do today's youth need to cope, thrive, and excel in the future or, more importantly, to be able to create their own future? In attempting to respond to a similar question, the views of 46 panelists interviewed by Shane were summarized in 28 premises which Shane believes "suggest provocative future changes in practice" (Shane, p. 56). The 28 premises are quite all conclusive and if they were to be carried out, they would involve creating and strengthening five abilities in learners. These are as follows: 1) an in-depth knowledge of the world and its peoples, a knowledge of 'realities,' 2) a strategy for schools to apply in developing awareness of alternative solutions to problems, 3) development of sensitivity to the consequences of one's choices, 4) cultivation of the insights and values that support wise choices among alternatives, 5) the skills, the information, and the motivation that are requisites for implementation (Shane, pp. 56–57).

Whatever skills teachers are trained to teach, Botkin and others believe there should be a balance of maintenance in learning as well as "innovative" learning.

> Maintenance learning is the acquisition of fixed outlooks, methods, and rules for dealing with known and recurring situations. . . . It is the type of learning designed to maintain an existing system or an established way of life. Maintenance learning is, and will continue to be, indispensable to the fundamental stability of every society. But for long term survival, particularly in times of turbulence, change or discontinuity, another type of learning is even more essential. It is the type of learning that can bring change, renewal, restructuring, and problem reformulation and which we shall call innovative learning (1979, p. 10).

A primary feature of innovative learning is "anticipation." Anticipatory learning prepares people to use forecasting techniques, simulation, and scenarios. Whereas problem-solving would appear to be a valuable tool to integrate into all disciplines, Botkin and others believe it too limiting because prior to and underlying the problem-solving type of learning, there needs to be a process of problem-perceiving, defining, and formulating.

Another feature of innovative learning is that of participation. This

is more than the formal sharing of decisions, it is an attitude characterized by cooperation, dialogue, and empathy. Shane and Botkin both suggest greater emphasis on stimulating the creative potential of the brain. In his studies of brain-compatible teaching, Hart (1978, pp. 42–43) also believes learners should be encouraged to use their brain in intuitive, creative, and pattern-detecting ways.

Although there is and needs to be a place for the "basics" which takes care of much of the maintenance type learning offering stability to a changing world, there is also need of a new set of basics. "What curriculum should consist of in order for youth to function successfully in society is the integration of skills which transcend any barriers or obsolescence created by change" (Eggers, p. 20). The author believes such a curriculum should foster the integration of process skills such as creating, valuing, choosing, communicating, cooperating, and discovering.

Construct VIII: Teacher preparation should take the initiative in re-educating the public to alternative futures, and encourage, support and persuade other institutions to assume greater responsibility in the education of youth.

Teacher training institutions have a responsibility to be in the forefront in shaping the educational process. When changes occur in the direction schools need to take, teacher educators should be instrumental in re-educating the citizenry on the merits of these changes. The advice of Glines seems most appropriate. "The dangers of the coming decades are great, the possibilities are still greater. Educators must work to educate the community to accept change, to prepare for fundamental adjustments in society, to reform the current school system" (p. A–26).

Teacher preparation cannot be expected to train teachers to be the bandaids for the American society. It was the general opinion of the professional educators and leaders interviewed by Shane that, "the pressures of life for the next several decades promised to be such that traditional schooling alone could not be expected to meet the responsibilities which, in all probability, will place heavy demands on all educational resources" (p. 57). It no longer makes sense nor is it feasible to cram education into the first 18 to 20 odd years of life. Nearly everyone who has studied the misdistribution of schooling over a lifetime agrees that the system should be reorganized and the years of education reallocated over the period of a normal lifespan.

The task of "educating" today's youth is becoming too complex

and costly to remain in the hands of one institution. Turning more of the responsibility of educating youth to other institutions is part of the answer. Schools being assertive in relinquishing part of this responsibility and supporting those learning experiences developed by other institutions is urgently needed.

Summary

It was ironic that when *Newsweek* magazine did its cover story on the flunking of America's schools, the United States was on the verge of successfully completing one of its greatest achievements—the launching and landing of the space shuttle. Cannot teachers take some credit for this? After all, America's people are products of the schools. Certainly all of America can feel some ownership of these accomplishments. In the case of teacher education, however, it cannot be forgotten that it is, or at least should be, a profession dedicated to the future. For this reason, the issue is one of not how far it has come, but rather, how far teacher education and K–12 schools have to go to prepare students with those skills they need to live in the future.

Teacher education is at a crossroad. At no other time in history has it had a greater opportunity to influence the making of a new world. Yet, the road it is taking to get to the future is virtually the same road it took to get where it is now. There is a continued emphasis on theory rather than practice, emphasis on content rather than process, emphasis on nationalism (which fosters competition and independence rather than global interdependence), an emphasis on maintenance learning rather than innovative learning, and an emphasis on campus-based teacher education rather than field-based teacher education. More discrepancies could be mentioned, but the point is, reform in teacher education today will need to be significantly different if significantly better futures are to occur.

What will it take to initiate teacher education reform for a desirable future? It will certainly take some individuals who are risk-takers to chart new paths. But more importantly, it will take people with dedication and commitment to the teaching profession. For this reason, there is cause for a good deal of hope, because, by and large, teacher educators are dedicated to their profession and do desire the best for their constituents. It is a time of re-awakening, a time of self-renewal, and a time marked by a spirit of new discovery. Because of the dedication and commitment of those people in teacher education, I am confident that roads which lead to other alternatives

in education will be taken. Because of this, there is every reason to believe there is definitely a future for teacher education.

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Two Views of Educational Technology in the Future

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The history of education is littered with predictions that "the time for educational technology to replace a major portion of human instruction has come." High costs, expectations which far exceeded the reality possible, and resistance from educators have combined to disprove these forecasts time and time again. Why then should anyone take seriously current statements that information technology will transform educational practice in the next decade?

The answer to this question rests on a number of developments which have occurred in the past few years:

1. The costs of computer and telecommunications hardware have fallen precipitously and will continue to plummet for at least another ten years.
2. The capabilities of courseware for computers and telecommunications devices have been greatly expanded, partly through increased programming experience and partly through the development of new, "artificial intelligence" based approaches.
3. Public dissatisfaction with the expense of schooling relative to the levels of achievement students are attaining has become acute. Educators are being given an ultimatum to be more effective at less cost.
4. Home computers and cable television are bringing many households into direct contact with instructional technology as an alternative learning tool.

Thus, simultaneously, the economics of educational technology are favorable, the capacity for a genuine contribution to learning is present, the schools' ability to resist innovation is weakened, and the public is aware of technology as an alternative approach. As a result, a "reformation" in education is about to occur.

How May a Shift to Using More Technology Take Place?

A variety of plausible alternative scenarios can be constructed for the emergence of information technology as a major educational tool. One metaphor used by futures researchers is to view the future as a "tree." We stand on the trunk of the tree (the present) looking upward toward the branches (the major likely alternative futures). Each step we take up the trunk toward the branches (each decision we make in the present) chops off a branch (removes a cluster of possible alternative futures). By the time we reach the branches—when the future becomes the present—all the branches are gone but one (the new trunk), and a new set of alternative futures stretches upward.

Who the major actors are in implementing information technologies in education and how these actors interrelate will be crucial determining factors in which alternative future emerges into reality. Some major potential "players" are the equipment vendors, the media, families, textbook publishers, the federal government, the formal educational establishment (teachers, administrators, chief state school officers), state governments, and individuals knowledgeable in software production (i.e. television directors). One way of visualizing the range of possible transitions to using more technology is to examine two ends of a continuum: one future in which all these players cooperate in adding technology to the spectrum of instructional techniques in schools, another future in which none expend much effort in this direction. (The most plausible futures are between these two extremes, but such a contrast does highlight the policy issues involved).

Scenario I:
Participatory Technological Development

Technological Possibilities:

If the major participants were to work together in exploring the potential of instructional technology, equipment vendors would likely make available in interested school districts, long-term, low-interest loans of equipment and courseware. (Such a policy would be to the advantage of information technology corporations, who would thereby create both a long-term institutional market for their products and services and an arena for evaluating the strengths and weaknesses of different technology-based approaches). The textbook publishers would contribute to this enterprise their knowledge of specific skills

and concepts mandated as content for the curriculum and their expertise in disseminating new materials to teachers. (In this manner, publishers would be able to finance the transformation of their materials from written to electronic form, an expense which they cannot meet from current operating revenues). Individuals knowledgeable in software production would then have an opportunity to produce materials tailored to the school environment with sufficient amounts of capitalization to ensure products of high quality.

In this scenario, the formal educational establishment would probably develop "buying collectives" and "courseware clearinghouses" as means of insuring quality products. Regional networks of schools would be used for systematic research on which portions of the curriculum could be taught effectively using technology, and which could not. (By such participation in the development process, educators would relieve some of their financial problems, restore public confidence, make teaching more attractive by removing some of the drudge work, and ensure that technology is not substituted for human instruction in appropriate areas).

Families, the media, and the workplace, in this future, would all reassume some of the educational functions they have shunted off to schools over the past several decades. Instructional technology would provide a vehicle for those groups to act in partnership with formal education in shaping the learning of the student, while making the educational process motivating and uncomplicated enough to render such a cooperative relationship attractive.

Federal and state governments would aid use of information technology by acting as brokers and coordinators among the different actors involved. Gains in educational equity would be of special concern; universal access to instructional devices and preparation of software targeted to special needs and backgrounds would be priorities for government expenditures. Hardware and courseware development would be regulated only as needed to ensure that every party in the educational process had a vested interest in improving instruction—whether by people or by machines.

From the increased use of educational technology, a fundamentally different model of teaching and learning would eventually evolve. This new paradigm would include:

—a centralization of curriculum development and financing

—a decentralization of the learning environment into homes, committees, and industries

—a decredentialization and informalization of the educational experience

—new types of diagnostic, assessment, and evaluation strategies in response to larger grading pools and altered definitions of learner effectiveness

—new administrative networks, with the erosion of many middle management positions as increased information transfer becomes possible without intermediary functionaries

—new types of people attracted to the various educational professions, with different skills and salary requirements

—a revolution in the process and content of teacher training/certification/staff development

In brief, from such a future focus on technology, sweeping changes in roles and relationships would occur for parents, teachers, administrators, industries, publishers, media, and government.

Philosophic Considerations

This scenario assumes that people in education (in its broadest perspective) should create a process for participatory planning pursuant to the use of technology in the future. Although this scenario is not philosophy-free in its assumptions, the authors do believe that it provides an isomorphism for linking divergent philosophic systems into a long-range paradigm. Technology, for example, can help to resolve problems addressed by transmissive philosophies. Essentialists will find it useful in the standardization of curriculum competencies. Technology can be used to individualize competency-based instruction in response to the ability and/or mobility of students throughout the country. The idea of "back-to-basics" could be implemented through millions of learning centers and programs in schools and homes throughout the country. Technology can be all-pervasive as this isomorphism brings school and home together. For the perennialist, technology can facilitate the "great books curriculum." Individualized screens can project all (or selections) of the classic writings which have stood the test of time. Reading does not necessarily become extinct with the development of educational technology. Tomorrow's students may far exceed our expectations regarding the reading of perhaps 10,000 books in a lifetime.

From another philosophic view, technology can facilitate the experimental, experiential, situational education of the pragmatist.

Through technology, the pragmatist can provide for the transmissive part of the curriculum and free teachers to create situational learning experiences relative to the social problems or interests of the students and the unique needs of particular communities. Technology may be applied, through this philosophy, to the rapidly changing knowledge base as well as the analysis of values. As with the other theories, the success of the learning environment is dependent upon how the classroom teacher uses the technology (as the medium is not necessarily the message).

The educational proposals of the reconstructionist theory are also congruent with educational technology. The development of reconstructionist futures studies necessitates an expanding information network as well as a means of selective use of the materials. The integration of the past with future alternatives (both probable and/or desirable) in an interdisciplinary and cross-generational program is a reconstructionist goal that is very responsive to technological resources.

Although the authors have preferences about the most appropriate theories in relation to technology, this scenario construes a paradigm for education that facilitates diverse philosophic applications of technology. This does not mean that the theory or rationale for technology is insignificant. Actually, philosophy of education may be a central issue in all schools as technological considerations are debated.

Scenario II: Non-participatory Development in Educational Technology

In the scenario at the other end of the continuum in which none of the "players" expends much effort on adapting information technology to school usage, a very different outcome is likely. Information technology corporations would concentrate on the home market; since the affluent are the major consumers of products such as home computers, courseware would be designed solely for students from privileged backgrounds. Families would purchase these devices and materials without any particular expertise in curriculum development or instruction, so the quality of many products might be low. In addition, in the absence of an institutional market, no incentive for standardization of equipment and programming would exist, and work toward innovation and improvement would be correspondingly hindered.

Textbook publishers, currently badly undercapitalized, would have neither the incentive nor the funding to convert their products to electronic form. The curriculum distribution networks which service educators would continue to ignore information technology, and independent software purchasers would be unable to achieve sufficient market penetration to warrant a major campaign for school-based technology. Those portions of the formal educational establishment which resisted innovation in instructional devices would meet with no organized external pressure.

The workplace, the media, and families would all continue their relative isolation from learning, except in those families in which instructional technology was purchased as a supplementary learning aid. In communities in which such households were numerous, schools would be pressured—not to use instructional technology in the classroom—but to modify the existing curriculum to adapt to the existence of these extra-school aids. Parents would likely uncritically accept machine diagnosis of their children's learning patterns and would expect teachers to supplement and remediate as prescribed. Such indirect educational "reform" would take place haphazardly across the country, with neither the diagnostic programs nor the parents necessarily sophisticated about the learning process.

Federal and state governments, in this future, would expend no special effort or resources on encouraging schools to use educational technology. As a result, gains made over the last several decades in educational equity would begin to reverse, as differential extra-school access to instructional technology began to affect in-school performance. Two levels of schooling might emerge: one geared to students with technology-enriched environments, the other for students whose sole educational resource was traditional teaching. Given the potential these technologies have for improving the educational process (at worst, by increasing time on task), the latter group of students would be placed in an intrinsically inferior position, and the disadvantages to society of such a two-tier system would be profound.

In this scenario, a reversal of education's current slide toward financial stress and public disaffection would be unlikely. No current innovations offer much hope of so improving the existing teaching/learning model as to increase effectiveness greatly. As the society uses more and more information technology in the workplace, schools would drift even further from preparing students for the "real

world.'' Given the probably fragile and inflationary economy of the eighties, a major jump in educational funding is unlikely, and the labor-intensive approaches used by schools would continue to erode educational budgets. As the diversity of student needs grows given demographic changes, teachers would be increasingly unable to meet those disparate demands without the capability for individualization that technology can provide. In brief, such a future focus away from technology in schools would likely intensify all the problems schools have now without providing any obvious compensatory benefits.

Philosophic Considerations

This scenario depicts a kind of fast-food approach (or ''chicken shack'' type of education) to technological development. It might serve the purposes of some ''de-schoolers,'' but even Ivan Illich could not accept such an accidental, short-term perspective of decision-making. In a high-technology society, however, this scenario could eventually result in the education of Emile's and Sophie's as each family assumes responsibility for its education.

Most contemporary systems of philosophy would not support an accidental or naturalist view of education. Although they may have significant differences in metaphysics, epistemology and axiology, the systems do agree upon the concept of comprehensive planning. Implicit in educational philosophies is the idea of social invention. Social invention involves planned change and assumes intent on the part of decision-makers. Thus a social invention is a planned change (such as the Red Cross in 1864 or Alcoholics Anonymous in 1934). Social inventions may also be distorted to the point that they create social change (and the intent is not actualized) rather than social invention. The I.Q. test is an example of an invention which was distorted regarding its intent and its actual usage. Philosophy of education should be a major source for reducing accidents regarding innovations. Innovations in technology are directly related to social inventions in education. This remains true whether or not education leans toward either of those scenarios, and educators (and related participants) have just as much planning or inventing with a non-technological model as with a social invention model that supports educational technology.

One serious concern in American education has been in the realm of ''equality of opportunity.'' Numerous ''causes'' have developed to exemplify this concern. The women's movement, black move-

ment, or education of handicapped are examples of issues of equality. This realm of analysis would become increasingly important in an era of rapid information and communication. Students will continue to be more diverse in their abilities and interests. The second scenario makes it less likely that teachers will be able to satisfy the needs of large numbers of students. Social inventions will have a maintenance quality and will be less comprehensive. Equality of educational opportunity will be defined by a rich/poor split, with some schools offering a rear-view education of basics and vocational training while others offer an education based upon sophisticated information exchanges. Social invention would be confined to those institutions (or individuals) with the resources to obtain information technology. This raises serious concerns about democracy.

Concluding remarks

Neither of these extreme scenarios is probable, but they do illustrate the range of ways information technology could impact education over the next decade. Many benefits of instructional technology which seem promising on paper may be unworkable in practice, so the intent of the above analysis is not to suggest some headlong rush to implementation. However, the danger at present seems not to be that educators will embrace technology too swiftly and uncritically, but rather that schools will ignore the existence of these new devices too thoroughly and too long. At the moment, the formal educational establishment (and all the other participants) are far closer to the second future depicted than to the first. From a philosophic standpoint, this situation is very unfortunate.

Culture and Synergy: Tools for Educational and Social Reconstruction

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Emblazoned on a wall at one of the early New Earth Villages a decade ago was the following—"Do not adjust your mind, the fault is with reality." This graffiti is in many ways an appropriate motto for educational and social reconstruction, because it illuminates two of the important questions asked by philosophy: (a) What is the nature of the culture in which we live? and (b) What criteria can we use to judge a "good" culture? The latter question is particularly relevant if we are to attempt educational and social reconstruction as a means to an end.

In this article, two philosophical questions will be addressed: the first concerns the ontological nature of the concept of "culture"; and the second concerns the axiological bases for judging cultures. The answers to these questions are extremely important, particularly if we are to accept the challenge put forth by Thomas C. Hunt. Hunt states:

> We are born in different colors and in particular times and places, but always with the needs and potentialities of our common humanness. Our lives fill with joy and meaning as we find ways to actualize our human capacities. Recognizing that we cannot satisfy our basic needs and deepest aspirations in isolation from other persons, we properly ask: what kind of society nurtures the optimum self-actualization? And turning to education we ask: what kind of schools will help create and maintain this kind of society? (p. 86)

Futures research seems to be concentrated around three major modes of thinking. Extrapolative futurists see the future as a continuation of present trends, although some foresee the resultant future in a positive light while others view a very bleak future. Normative futurists, while they do see the impact of past and present trends, are concerned with images of preferable worlds of tomorrow. A third

group, who might be termed policy analysts, are the professional futurists who use their skills to help the decision makers of government and business. All three groups have in common the goal of a better future by bridging between the present and a preferable future.

Educational reconstructionists also see their role in helping to build such a bridge. They view the future as something for which they must actively work. They do not regard the future as inevitable, but rather the product of the collective will and actions of the inhabitants of the globe. The institution of education is seen as having a predominant role in helping to build the consensus of a future-oriented world view and in helping to assist in the realization of that future. To do so implies that humans can influence their future and that this influence can be directed toward the creation of a better world.

If we are to attempt to create a better world we must determine if we can, in fact, do so. And when we have created our image of "utopia," how can we judge it as "good"? An understanding of culture and synergy are necessary prerequisites to the educational requirement for an informal, participatory citizenry.

The Concept of Culture

There has been considerable debate about the definition of "culture" and how culture is to be transmitted in education. The most influential and most often quoted definition of culture is probably that of Edward Tylor, who stated:

> Culture, or civilization . . . is that complex whole which includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits acquired by man as a member of society (cited in Kroeber and Kluckhohn, 1952, p. 81).

Superficially, this statement does not present a problem to this writer. However, debate continues about the ontological nature of culture (Kluckhohn, 1964, pp. 19–73). Two very disparate views of culture have come forth: one view interprets culture as a real entity, while the other sees culture as a convenient abstract concept. The former view has been given many titles, among them the "sociologistic" (Newman, 1971) and the "superorganic" (Kroeber cited in Kroeber and Kluckhohn, 1952), but it is more commonly called the *sui generis* point of view. The latter is the *operational* point of view.

Leslie White (1975) is probably the most noted of those who hold a view of culture *sui generis*. His last book, *The Concept of Cultural*

Systems: A Key in Understanding Tribes and Nations, presents clearly and concisely this Realist ontology of culture. He states:

> Culture, as we use the term, is thus a distinct and logically independent order of phenomena. In actuality, of course, there is no culture apart from Homo sapiens. But at an object of scientific study and interpretation, culture may be considered without reference to the human species (p. 75).

He feels that he is not alone in holding such a view, aware that others (including Emile Durkheim) have held the view that culture is an autonomous process *sui generis*. White does believe that humans must be considered in the study of culture because:

> It is man who has made the existence of culture possible. Culture, in general, is what it is because man is the kind of animal that he is; had he been different, culture would be correspondingly different. We may, and must, assume that man's biological makeup makes a wide variety of cultures possible but imposes certain limits upon the content and scope of culture, even though we do not know the extent of these limitations. We thus arrive at two propositions: (1) man is necessary for the existence of culture, but (2) man is not necessary for a scientific explanation of variations in culture (p. 7–8).

He advances the proposition that humans have no free will; their behavior is determined by the complimentary interaction of the forces of biology and culture. White distinguishes between nonhuman behavior, which is biologically determined, and human behavior, which is determined by respective cultures (p. 8). White concludes that the behavior of individuals is affected (but not determined) by their biological makeup. For example, while all members of all cultures must satisfy their basic needs for food, clothing and shelter, which are biological needs, the means of meeting these needs is culturally determined.

An ontological view of culture is important to education because if a teacher, either consciously or subconsciously, holds that culture is *sui generis*, then the role assumed in the classroom vis-a-vis social change becomes very much prescribed. This is an Essentialist view of the role of education—the culture is to be transmitted. The concept of culture *sui generis* proscribes against using the schools as a means of social amelioration. White continues:

> If the cultural process is a process *sui generis*, and if cultural phenomena are determined by cultural phenomena, it follows that man lies outside the

> cause-and-effect sequence of cultural events. As a biological datum, man lies outside the cultural process; he enters it as a human being, but as a human being he is a constellation of cultural elements, a capsule of culture. The belief that man can control his culture, like other illusions, is made possible and nourished by a profound and comprehensive ignorance of the nature, structure, and behavior of cultural systems. The situation is like that of rain dances: the belief that man could bring rain by dancing was possible only because of ignorance of meteorological phenomena. The hardy perennials of illusion flourish in the fertile soil of ignorance (p. 9).

White believes that the driving force that brings about changes in culture is not the behavior of human beings, but the forces of technology (p. 178).

This Realist *sui generis* concept is most unsatisfactory to this writer. White has permitted himself to reify an analytical tool and has mistaken that analytical tool for reality. Much like a model, a cultural system is an analogy, an abstract—it must not be regarded as the real thing. Kroeber and Kluckhohn, in a landmark study of the concept of culture, had a similar criticism:

> The danger in the construal of culture as an emergent level evidently lies in the consequent tendency to reify or hypostasize culture, to view it as a distinctive substance or actual superorganism, and then to assume that it moves through autonomous, immanent forces (1952, p. 290).

Even though a theoretical construct can be developed and available knowledge can be jammed into it, it does not follow that the construct corresponds to anything in reality. The history of various concepts of the universe, from Ptolemy to Einstein, should help us to remember this. In shifting from the anthropocentric, mechanistic view of the Ptolemic universe to the relativistic cosmology of Einstein, the universe itself has not changed, but our conception of it most certainly has been radically altered.

After having examined 164 definitions and concepts of culture, Kroeber and Kluckhohn concluded that "culture is a product; is historical; includes ideas, patterns and values; is selective; is learned; is based upon symbols; and is an abstraction from behavior and the product of behavior (p. 308)." This is an operational view of culture—a more defensible viewpoint to this writer.

The place of the individual, as seen by Kroeber and Kluckhohn, is also very much different from that proposed in a view of culture *sui generis*:

> As Harris has recently remarked, "the 'whole' culture is a composite of varying and overlapping subcultures." Sub-cultures may be regional, economic, status, occupational, clique groups—or various combinations of these factors. Some subcultures seem to be primarily traceable to the temperamental similarities of the participating individuals. Each individual selects from and to a greater or lesser degree systematizes what he experiences of the total culture in the course of his formal and informal education throughout life . . . (pp. 308–309).

The collective behavior of individuals, therefore, constitutes culture.

A. F. C. Wallace (1961, p. 28) presents the implications of the operational view of culture. He sees culture not as a superorganic entity *sui generis* imposed upon individuals. Rather, it can be seen as policy which has been quietly developed by individuals. It can be perceived as a social contract—which we as individuals have helped shape and to which we as individuals subscribe.

The operational point of view is that held by Reconstructionists like Theodore Brameld. There might be those who would believe that the Reconstructionists and White might have some basis for agreement. Both use the concepts "crisis-culture" and "culturology." Both are agreed that the present state of affairs in the midst of crisis (White, 1975, pp. 10–12; Brameld, 1971, pp. 21–24). Both are, in the words of Fred Polak (1973), essence pessimists, but Brameld is an influence optimist (he believes that we can overcome the difficulties and improve the world), while White is a profound influence pessimist (he believes that there is nothing that we can do to overcome the crises).

An area of confusion that may bring readers to see some methodological commonality between White and Brameld is the stress that both place on the concept of "culturology." For both, this concept is central to their view of culture. White's view is clearly *sui generis*—"culturology is concerned with the interaction, not of human beings, but of cultural elements and traits (customs, institutions, codes, technologies, etc. . . .)" (p. 128). Brameld's view, on the other hand, is assuredly operational—"by culturology we mean here a philosophy of mankind that is primarily governed by, and exerts profound influence upon, the members of culture" (1972, pp. 4–5). Interestingly, Brameld credits White for the development of the term (1977, p. 74). Perhaps Brameld should have retained the concept of "anthropological philosophy." Much of Brameld's Reconstructionism is based on a triad of philosophy, education and anthropology.

That Brameld holds an operational point of view is most obvious in the not-so-subtle title of *The Remaking of a Culture*, in which he remarked:

> Contrasted with such an outlook [*sui generis*] is one which, again in technical terms, regards culture as a tool for understanding and coping with the relations of people living in a society—a concept that enables us to examine and interpret these relations and that often leads to various acts or controlled actions for solving human problems. *We call this the operational approach* (Brameld's emphasis) (1959, p. 117).

He goes on to say that this approach "presupposes a confidence in man's capacity to direct himself and his environment, while having full regards for obstacles and limitations" (p. 118).

The Concept of Synergy

If we conclude that culture is an operational term, then social amelioration, counter to the view of White expressed earlier, is very much possible. Indeed, having determined that we can shape our future, it is incumbent upon us to do so. This is so because, if we do not work toward a better tomorrow, some others may strive for a future that we do not regard as desirable. Implicit in these works is the belief that some cultures and futures may be better than others. If this is so then some basis for evaluating cultures, past and present, and images of the future must be established. Illich called for the establishment of some criteria in the following words:

> I believe that a desirable future depends on our deliberately choosing a life of action over a life of consumption, on our engendering a life style which will enable us to be spontaneous, independent, yet related to each other, rather than maintaining a life style which allows us to make and unmake, produce and consume—a style of life which is merely a way station on the road to the depletion and pollution of the environment. The future depends more upon our choice of institutions which support a life of action than on our developing new ideologies and technologies. We need a set of criteria which will support personal growth rather than addiction, as well as the will to invest our technological resources preferentially in such institutions of growth (Illich, 1971, pp. 75–76).

In this section, the task of developing some means of evaluating societies—past, present and future—will be presented. As the goal of Reconstructionists is social amelioration, we must take some responsibility for our actions. One of the distinguishing characteristics of

this philosophy of education in relation to other philosophies is that of concern for the future. As George Counts (1932) so boldly stated:

> Progressive Education wishes to build a new world but refuses to be held accountable for the kind of world it builds. In my judgement, the school should know what it is doing, in so far as it is humanly possible, and accept full responsibility for its acts (p. 22).

Reconstructionists must assume this responsibility and must have some axial basis for meeting that responsibility.

The basis that is proposed is that of "synergy," which can be defined as combined or cooperative action or force. Abraham Maslow (1965, 1971) can take much of the credit for bringing the concept to the attention of the world. However, it was developed by Ruth Benedict in the late 1930's (although it was not brought to prominence until 1970 when Maslow and Honingman edited her notes) (Harris, 1970). Placing great faith in the concept, Maslow claimed

> . . . no Utopia can be constructed henceforth by the knowledgeable person without making peace with the concept of synergy. It looks to me at this time as if any Utopia . . . must have as one of its foundations a set of high synergy institutions (1971, p. 200).

Synergy is, indeed, a truly powerful concept and is an excellent analytical tool for making axial statements about past, present and future societies. Therefore, it should prove of enormous value to Reconstructionists in understanding the problems of our present crisis-culture and in providing insight into past events that brought us to this crisis. Reconstructionists will find the concept of synergy of use in their attempts both to reform education and to ameliorate social problems. The institution of education must be one in which there is high synergy. High synergy must also be found in our society and the world.

Ruth Benedict (1934), whose earlier writings had implied some form of cultural relativism, had a very normative outlook on cultures. With some cultures she felt very uncomfortable; others gave her pleasure. Her earlier distinction between Apollonian and Dionysian cultures could not be used to distinguish cultures that were mean from those that were nice. These concepts had been borrowed from Nietzsche in an attempt to describe ideal types of cultural patterns. Dionysian cultures tended toward excesses, physical and emotional, while Apollonian cultures strived for moderation and stability. Benedict, in a series of lectures, said:

> I shall need a term for this gamut, a gamut that runs from one pole, where any act or skill that advantages the individual at the same time advantages the group, to the other pole, where every act that advantages the individual is at the expense of others. I shall call this gamut *synergy*, the old term used in medicine and theology to mean combined action.
>
> I shall speak of cultures with low synergy, where the social structure provides for acts that are mutually opposed and counteractive, and of cultures with high synergy, where it provides for acts that are mutually reinforcing (Maslow and Honingman, 1970, pp. 325–326).

Thus the spectrum of high and low synergy cultures was created. The concept can also be applied in other ways—for example, to institutions. Institutions with high synergy would be those in which individual behavior would benefit all.

However, Benedict felt this analytical tool required some field testing to prove its validity. Therefore, Maslow was dispatched to the prairies of western Canada to study the Northern Blackfoot. What Maslow observed in the Sun Dance ceremony helped to demonstrate the usefulness of the concept by showing the value of a high synergy institution. During part of this ceremony those who had accumulated material wealth would acquire status by giving away all of their possessions. In such an arrangement all members of the society benefitted. The individual giving away his possessions gained social status; those receiving the gifts gained economic security. Status was based on what one did, not on what one had. Before his death Maslow also attempted to show how the concept could be applied to our own society and to individuals. He also considered the usefulness of the concept in the context of management.

Of fundamental importance in synergy is the means of economic distribution of wealth and the status associated with that distribution. Two general types of economies were delineated: (a) "funnel" economies, common in low synergy societies, in which the rich get richer and the poor get poorer; and (b) "siphon" economies, in which the wealth got spread around. In low synergy societies there appears to be a positive correlation between wealth and status, while in high synergy societies the correlation appears to be negative. The importance of economic concepts has led to a comparison between Benedict and Adam Smith, who postulated that private greed serves the public good. But as Harris (1970) points out,there is a profound difference. Smith believed that synergy was inherent, while Benedict found that it depends on the configuration of the culture.

Synergy as a concept is complimentary to some aspects of game theory. A zero-sum game is one of pure competition or conflict where one player's winnings and other players' losses will total zero, i.e., one person gains at the expense of others. In a non-zero-sum game the winner's gain is not necessarily at the expense of others. Biological relationships form another appropriate analogy as well. In a high synergy society, which might be viewed as a non-zero-sum game, the relationships between individuals are of a symbiotic nature. On the other hand, in a low synergy society, much like a zero-sum game, the relationships are parasitic.

The call for the inclusion of the concept of synergy in educational and social reconstruction is not new. Sir Thomas More must have had some understanding of synergy when, in his *Utopia*, he chained his criminals with gold, thereby lowering the value of that commodity. William O. Stanley (1953) had in mind a similar concept in his own discussion of social integration. More recently, the concept has been presented in *Educational Futurism: In Pursuit of Survival* by John Pulliam and Jim Bowman (1974) and in *The Far Side of the Future* by Pulliam, Bowman, Fred Kierstead and Chris Dede (1978). Of particular interest is the suggestion that a systems approach to synergy be explored (Bowman et al., 1978, p. 78). The use of the two analytical tools in conjunction could prove themselves to be very synergetic.

Draper Kauffman (1980) claims that systems are apparently goal-seeking. Using this as a basis, synergy might be defined as the degree of congruity of goals amongst systems and with the goals of the cultural system itself. A high synergy culture would have a high degree of congruity, and a low synergy society would be one in which there was a small amount of congruity. The goals need not be identical, but they must be harmonious.

A systems analysis of North American culture might lead one to perceive the cultural system as consisting of a political system, a social system, an economic system, a philosophical system, a technological system, and an ecological system. The goal of the political system appears to be the accumulation of power; the goal of the social system is apparently the accumulation of status; and the goal of the economic system appears to be the accumulation of wealth. In each case the "game" is of a zero-sum nature; i.e., it is a win-lose situation. These goals are in stark contrast to the philosophical system, which apparently has as a goal the equality of opportunity. The ideal of democracy is most certainly not found in the economic

system; industrial democracy, in particular, does not seem to be a goal. This analysis, as crude as it is, at least points to a need for further study in this area and assuredly supports the proposition that we live in a crisis-culture.

Synergy can also be a useful tool in discussing and analyzing the future of our culture. It can help in the formation of our utopian images of the future. We must seek a fuller understanding through the application of the concept.

Conclusion

The paths to the future are varied. The prerequisites to a preferable future may be difficult to meet. Fred Polak tells us:

> *The rise and fall of images of the future precedes or accompanies the rise and fall of cultures* (Polak's emphasis). So long as a society's image is positive and flourishing, the flower of culture is in full bloom. Once the image begins to decay and lose its vitality, however, the culture does not long survive (1973, p. 19).

Most of us are familiar with the concepts of the self-fulfilling and self-negating prophecies as images for the future. While these images are necessary, they are not sufficient to ensure a better future. They do not provide a fundamental analysis of the present and the past, and they do not provide a worthwhile understanding of our relationship with the future. We must not only know where it is that we want to go, but we must also understand how to get there, and we must recognize blockages and reversals in our paths. This requires a thorough, on-going analysis.

This paper began with the purposes of education as perceived by Thomas C. Hunt (1973). It will close with his excellent description of the goal of the education system—a goal that must be harmonious with the rest of the culture and the globe.

> We are three and a half billion human beings seeking to live a full life. We have not yet invented the social arrangements to reward our search. We live in conflict. Science and technology have given us untold power, which we use to destroy one another and our common environment rather than build life. We live in conflict. We erect divisions and hostile ideologies. And we live in conflict. Yet our schools keep nurturing us in old ways, seldom challenging us to find the means to resolve the conflicts. Education can do better. It can help us discover ourselves as human beings; and it can help us identify and overcome the obstacles to our mutual growth (pp. 110–111).

The system of education needed to facilitate these goals runs counter to much of current cultural and educational thought. But by reconstructing education we can reconstruct our society and build a better tomorrow. Our present educational system does not provide the means for shaping the future; it provides for the transmission of the past, or at best, the present. A reconstructed education can provide people with the knowledge, skills and attitudes necessary to bring about a preferable future.

It is hoped that an operational point of view of culture and an understanding of synergy will help in creating that future.

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